The AUTOMOBILE

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The AUTOMOBILE

Spring Apparel for the Automobilist

Smart Dustcoats Mark This Year's Fashions

OBEDIENCE to the exacting dictates of Fashion is universal. It is amusing, not to say often pathetic, to realize how meekly the world submits. We all obey more or less blindly, but there are widely varying degrees of willingness manifested in the submission. And the factor which more than any other governs the readiness with which a new law of fashion is accepted is utility. We are grateful for any new rule in dress that can boast of the least suggestion of reason for the change. Too many have none; and the innate craving for something rational has to be stifled so that we can venture out into the open wrapped up in that mystery which the fashion writers delight to call *le dernier cri.*

Fig. 1—The mackinaw is now a most popular automobile garment. Striking patterns are the rule

Fashion has now to be reckoned with in the automobile. We have long passed the stage when the car itself was the thing. How to appear in it with comfort and distinction is receiving more and more consideration. A review of the automobile clothing shops reveals the fact that the satisfactory blending of appearance with utility is the keynote of this year's apparel for the automobilist. It has always seemed incumbent on the motorist to wear something different than the man in the street. In the early days he was looked on by many as a crank, and it must be confessed that if he did not intentionally dress for the part his efforts to destroy the general impression were not very noticeable. His manner of enveloping himself cocoon-like in huge and needless masses of fur was seized on with avidity by the comic artists of the period, and with good reason. Winter coats of the present time have the quality of warmth without this loud mark of external eccentricity. In this and other directions, the sartorial artist has turned his attention to the profitable field of the automobile with results that can only be looked on as satisfactory.

The general trend has been to produce garments that while supplying the peculiar needs of the automobilist do so without making the wearer conspicuous should he take to the sidewalk for a few blocks. Many of this year's overcoats, indeed, are hardly distinguishable from the ordinary overcoat. The differences lie in the direction of increased roominess, particularly at the junction of sleeve and shoulder and also about the skirt. These variations from the everyday cut are conducive to comfort in the sustained sitting posture of the motorist and hinder fatigue at the shoulder when holding the steering wheel.

Spring is now with us, the poet has had his say—or hasn't, which is just as well, and the mind of the enthusiastic motorist is dwelling longingly on the delights of touring and the open road. The time is opportune to cast an eye over the automobile wardrobe and note what deficiencies can be filled.

The most indispensable of all automobile garments is the dust coat. This year an amazing variety of types, each possessing merits worthy of consideration make it a difficult matter to form a decision when purchasing. In all of them there is a marked difference to the duster of a few years ago. At that time the owner of a car was content with something light that kept him from dust and it was thought that there were not opportunities of introducing some semblance of style into the garment. Possibly it was considered that the cheapness of the material did not warrant any expenditure of thought over the cut. A glance at the long line of dusters on view at present shows that a really smart looking garment in the various light

Fig. 2—Light raglan waterproof with velvet collar and velvet trimmed half belt. Price $25

Fig. 3—Double-breasted duster in striped gray poplin with convertible collar. Price $22.50

Fig. 4—Handsome dustcoat in light poplin with wide half belt. Listed at $25

Fig. 5—Smart duster in cravenneted worsted with breast pocket and close-fitting collar, $20.

materials that are used for this purpose can be produced at a reasonable figure. Favorite materials are mohair, linens, pongees and poplins, and there is an increasing demand for gray tones that will render the inevitable grease spots less noticeable.

The line of demarcation between the duster and the rainproof is not very definite. The rainproof proper is not so cool as the duster, but a combination garment formed by subjecting the lighter stuffs to water-proofing processes is meeting with an appreciative demand. These coats are all that is necessary to ward off the summer shower and save the trouble of changing into a rubber garment.

Many varieties of storm-resisting apparel are being displayed in the stores. The old term rainproof has been found wanting. The automobilist in a real downpour requires special protection, and any garment that can provide it is entitled to the stronger expression of being stormproof. The most perfect of these storm protectors is the so-called rubber apron much used by chauffeurs. In these, the only openings are the sleeves and a neck hole. Entry into the garment is rather a troublesome operation, but once there the elements can be defied. Besides the heavier types of black rubber storm apron some makers are listing a lighter type of a smarter appearance for owners.

Fig. 8—New driving glove with reinforced palm for hard wear

Another form of rainproof that is popular is the white rubberized duck coat. This always remains spotlessly white and holds its shape, and trimmed with black velvet at the collar is a smart looking garment. For hot weather, however, where such a waterproof would seem uncomfortably heavy, a silk oil would better suit the purpose. These garments cannot claim anything in the way of appearance, but they are so astonishingly light, consjsting practically of a transparent skin, and moreover are capable of being rolled up into such a small compass that they form a useful addition to the touring motorist's wardrobe.

With regard to the cut of the shoulder this year shows the raglan type to be still popular, although the regular inserted coat sleeve is in the majority. The collars are also divided into two camps—the tight fitting military and the conventional lapel. A type which is increasingly popular is called the convertible, and in this the lapels can be worn open during fair weather to get advantage of the breeze and folded over when protection of the throat is desired. This snug fitting of the neck is a matter that has received a great deal of attention at the hands of the designers, with the results aimed at. To prevent the entry of dust at this point goes a great way toward a tidy appearance when the garment is taken off.

Developments are also to be noted in other departments of automobile wear. Gloves, for instance, are now made with an eye on the hard usage that they are subject to on the driver's hands. Various kinds of reinforced palms are being exhibited, while the heat of a heavy driving glove is being obviated by incorporating lisle or other thin ventilating material into the backs and the unused parts of the fingers.

A glance at the displays of goggles and other face protectors shows that the main change to be noted is a demand for goggles that will be as inconspicuous as possible. There is also a great demand for large lens spectacles. These latter are being found to afford ample protection from the direct flow of dust, do not limit the angle of view as do many of the older gogle forms and furthermore permit a constant movement of air about the eye and so reduce eye strain in warm weather.

Fig. 6—Smart skeleton-lined overcoat in army cloth for the touring motorist. Price $30

Back view of army cloth coat showing half belt and center inverted pleat at the back

Fig. 7—Rubber apron that is absolutely waterproof. Snap buttons are used throughout

Showing method of fastening apron by neck bands. This storm protector is listed at $25

Not much change can be recorded in the design of uniforms for the chauffeur. What little there is in the direction of bringing the uniform more into the field of the ordinary garment.

In Fig. 1 is shown a Mackinaw jacket which is becoming exceedingly popular. These are supplied in a great variety of patterns, the one illustrated being a shepherd's plaid. They have a sporty appearance and are thick enough to afford ample protection against cold.

Fig. 2 shows a favorite type of duster in dark grey striped poplin. The collar is convertible and the garment looks smart either way. The sleeves are provided with elastic wind shields.

A cravenetted worsted double breasted duster with a high military collar is illustrated in Fig 3. This coat has a special neck tag to insure tight buttoning up of the collar, wrist shields and a pleated breast pocket, as well as the ordinary slot pockets at the sides.

The back view shows a distinctive dust coat in light poplin. A half belt of the same material extends from pocket to pocket and wrist shields in addition to outer wrist straps are fitted. The collar is high and fits the neck snugly.

Fig. 4 shows a light waterproof in dark grey with raglan shoulders. A velvet trimmed collar adds considerably to the appearance of the garment. The rubberized material is double around the shoulders. The arm holes are deep to allow freedom of movement and the arm pit is ventilated. A half belt trimmed with velvet in a similar manner to the collar is fitted behind. The side pockets are of the slot type.

Back and front views of an extremely smart overcoat for touring are shown in Fig. 6. This model, supplied in army cloth is light and is equally of use in or out of the car. The sleeves and shoulders are lined and looseness in the skirt is secured by means of an inverted center pleat extending from the waist at the back. A buttoned half belt is fitted.

Fig. 7 illustrates a storm proof apron as seen from back and front. The arrangement of the flaps at the opening for the neck are such that there is no possibility of rain entering. All buttons are of the snap pattern used in gloves. The outer collar formed in one with the breast flap is secured at the back by these buttons as shown in the back view. A strap at the wrist produces a tight fit and prevents the entry of water at that point.

An ingenious method of increasing the wearing qualities of gloves used by drivers is illustrated in Fig 8. Extra thicknesses of leather are sewn on the inner surfaces of the fingers and over the palm where the glove is in constant contact with the driving wheel. Another development in glove design is shown in Fig. 9. This is intended for summer wear when the ordinary glove is generally found to heat the hand too much. The back of the hand portion and the fingers are cut away and silk lisle of a color to match the glove inserted. By this means ventilation is secured.

THE AUTOMOBILE is indebted to Saks & Co., of New York, for the use of the garment shown in Fig. 1; to The Auto Supply Co., New York, for those illustrated in Figs. 5, 6, 7, 8 and 9, and to James McCreery & Co., New York, for the coats shown in Figs. 2, 3 and 4. Photographs by N. Lazarnick, New York.

Fig. 9—Summer glove with ventilating back of silk lisle

Ford To Add 500,000 Square Feet

Chalmers Adds 50,000 Square Feet — Schaefer is Abbott President

DETROIT, MICH., May 20—Although it has been common property for some time that the Ford Motor Co. was contemplating the further enlargement of its plant in Highland Park. According to a statement emanating from the general offices of the Ford company the additions will increase the total floor space from 1,270,062 square feet to 1,794,974 square feet, or about 500,000 square feet. Two new factory buildings, each six stories in height and measuring 60 feet in width by 900 feet in length, are to be erected, the plans being prepared under the supervision of the company's consulting engineers.

Craneways, which will be under a glass roof, will extend the length of the structures and will afford means of transfer of parts or other material from any point in the factory to any other. The additions will mean much to Detroit, as they will make necessary the employment of several thousand more men, which will probably swell the total number to around 16,000. There are at present about 14,500 employed by the concern.

In addition to the extensions of the plant proper, two stories are to be built onto the office and administration building in front of the plant, and material extensions to the Ford sales and service station, located at the corner of Woodward avenue and Grand Boulevard, are also planned. Five stories more are to be added to the latter, while its frontage on Woodward avenue is to be increased from 100 to 321 feet. The depth of this building is 97 feet.

Chalmers' Factory Addition Planned

DETROIT, MICH., May 19—The large Chalmers Motor Co. plant on Jefferson avenue is to be further enlarged by the addition of another wing measuring 220 feet in length and 60 feet wide. The added floor space will be about 50,000 square feet, the structure being four stories in height according to the plans. The new building will be made of concrete and steel, and the ceilings will be flush. That is, there will be no exposed beams. Inclosed bridges of steel will connect each floor with those of the adjoining building. With the completion of this latest addition the Chalmers company will have added some 200,000 square feet of floor space to its already large plant within the last year, and it will bring the total expenditures for additions and improvements to plant during that period to $400,000. Five other structures have been added, ranging from one to four stories in height as well as extensions to other departments.

Schaefer Elected Abbott President

DETROIT, MICH., May 21—*Special Telegram*—The creditors' committee of three, consisting of A. H. Zimmerman, Continental Motor Mfg. Co., A. W. Lewis, Timken-Detroit Axle Co., and H. J. Mallory, Weston Mott Co., has chosen A. E. Schaefer, formerly with the Ohio Motor Co. as president and general manager of the Abbott Motor Co., which recently went into the hands of the creditors' committee. Mr. Zimmerman has been made vice-president and treasurer and, while no secretary has yet been appointed, this office will be filled before the end of the week. The committee reports progress and its actions have met with the entire approval of the creditors. The directorate will consist of nine, most of the members of which will be chosen from the creditors. The committee expects to complete the list of directors by the end of the week.

France's Exports Gain $2,602,380

PARIS, FRANCE, May 12—Although rumors of war have caused a falling off in home business, the automobile export trade of France continues to be good. According to the official returns, the increase in exports for the first 3 months of the present year, compared with the corresponding period of 1912 is $2,602,380. Four countries show a falling off in their purchases with France: England, $281,940; Switzerland, $77,340; Turkey, $19,880; United States, $26,460. All other nations show an increase, the greatest jump being with the Argentine Republic. The official figures for exports during January, February and March, 1912 and 1913, are:

	1912	1913
England	$2,859,360	$2,577,420
Belgium	1,918,560	2,339,520
Argentine Republic	448,700	1,194,360
Brazil	449,640	729,420
Germany	600,900	680,460
Algeria	769,860	945,120
Italy	114,240	281,700
Spain	219,060	252,540
Russia	63,840	247,920
Switzerland	262,380	185,040
United States	168,780	142,320
Austria	61,920	76,320
Turkey	59,580	37,700
Other countries	929,280	1,844,040
	$8,926,500	$11,528,880

Imports of automobiles into France have increased, the figures for the first three months of 1912 being $476,160, compared with $838,560 for the present year, being an increase of $362,400, or 76 per cent. The greatest increases have been obtained by England, Germany, Belgium, Switzerland and the United States. England has increased her business with France 125 per cent. during these three months and Germany shows an increase of 128 per cent.

Houpt To Handle Lozier in Metropolis

NEW YORK CITY, May 20—Harry S. Houpt, Inc., will after June 1st handle the Lozier car for New York and the Metropolitan territory, succeeding the present branch arrangement. Mr. Houpt, who is president and general manager, was until recently head of the sales department of the American Locomotive Co. With him is L. A. Van Patten, vice-president and salesmanager, and who is at present advertising manager of the Alco company. J. V. Westervelt will be secretary and treasurer of the new concern.

Westinghouse Report Shows Gains

NEW YORK CITY, May 21.—The Westinghouse Electric & Mfg. Co. published its annual report yesterday, showing gross earnings for the year ending March 31, 1913, of $40,000,000, $3,164,032 being available for dividend payments. After paying 7 per cent. dividends on the preferred stock, 8.2 per cent. remained for the common stock, as compared with 6.12 per cent. for the previous year.

Automobile Securities Quotations

Changes in price were rather mixed during the past week, and the amount of trading also varied with the several issues dealt in on the Exchange.

	1912 Bid	1912 Asked	1913 Bid	1913 Asked
Ajax-Grieb Rubber Co., com	..	125	155	..
Ajax-Grieb Rubber Co., pfd	95	100	95	100
Aluminum Castings, pfd	100	..	98	100
American Locomotive Co., com	42½	43	32¼	32½
American Locomotive Co., pfd	107	109	102	103
Chalmers Motor Company, com	..	..	127	135
Chalmers Motor Company, pfd	..	..	98	102
Consolidated Rubber Tire Co., com	18	20	14	18
Consolidated Rubber Tire Co., pfd	58	..	60	75
Firestone Tire & Rubber Co., com	285	295	254	260
Firestone Tire & Rubber Co., pfd	106½	107½	105	107
Fisk Rubber Company, com	..	..	..	..
Fisk Rubber Company, pfd	..	..	..	100
Garford Company, preferred	100	..	..	97½
General Motors Company, com	35	37	25	30
General Motors Company, pfd	76	77	70	77
B. F. Goodrich Company, com (new)	86	86½	30	31
B. F. Goodrich Company, pfd (new)	108	108¼	92	94
Goodyear Tire & Rubber Co., com	265	275	316	322
Goodyear Tire & Rubber Co., pfd	105	105½	98½	100
Hayes Manufacturing Company	..	104	..	90
International Motor Co., com	33	35	5	6
International Motor Co., pfd	93½	96	10	15
Lozier Motor Company	..	55	..	20
Maxwell Motor Co., com	..	..	2	5
Maxwell Motor Co., 1st pfd	..	..	40	50
Maxwell Motor Co., 2nd pfd	..	..	12	15
Miller Rubber Company	160	165	140	150
Packard Motor Car Company, pfd	104½	106	98	102
Peerless Motor Car Company, com	..	..	40	50
Peerless Motor Car Company, pfd	..	..	..	96
Pope Manufacturing Co., com	29	31	15	16
Pope Manufacturing Co., pfd	73	74¼	48	51
Portage Rubber Co., com	..	..	35	45
Portage Rubber Co., pfd	..	..	90	95
Reo Motor Truck Company	9	10½	10½	11½
Reo Motor Car Company	24½	25½	20	22
Rubber Goods Mfg. Co., pfd	104	108	105	111
Studebaker Company, com	39	40	27	29
Studebaker Company, pfd	96	98	88	92
Swinehart Tire Company	112	114	85	85
U. S. Rubber Co., com	..	..	62½	63
U. S. Rubber Co., 1st pfd	..	..	104½	105¼
White Company	107½	108½	107	110
Willys-Overland Co., com	..	..	63	66
Willys-Overland Co., pfd	..	..	90	95

Matheson Sale's First Day Brings $81,000

Bid $310,000 for Columbus Buggy —Bergdoll's Sale Brings $45,062

WILKES-BARRE, PA., May 21—*Special Telegram*—The sale of the receiver of the Matheson Automobile Co., of this city, opened yesterday, under the supervision of W. C. Shepherd, former president of the company and now receiver. The total realized on the first day of the sale was $81,000, which includes $30,000 realized on business good will, trademarks, etc., patterns and drawings. The sale will continue through today and tomorrow, when finished cars and shop equipment will be sold.

The Matheson company went into the hands of the receiver some time ago. On April 21, the condition of the company's liabilities was as follows: It owed $200,000 first mortgage, of which $183,200, the interest on which totaled $4,268.56. The second mortgage amounted to $105,000, including outstanding bonds to a total value of $68,500 and interest.

Columbus Buggy Co. Sale Confirmed

COLUMBUS, O., May 19—Judge J. E. Sater in the U. S. Court late Monday, May 19, confirmed the sale of the assets of the Columbus Buggy Co., to D. N. Postlewaite, representing the creditors' committee at the bid of $310,000. The objection of the McCue company, a creditor, on the ground that more money could be realized, was overruled. Steps are now being taken to reorganize the company and operate the plant.

Bergdoll Assets Bring $45,062.87

PHILADELPHIA, PA., May 19—The 2-day sale in bankruptcy of the Louis J. Bergdoll Motor Co., southwest corner of Sixteenth and Callowhill streets, realized known assets of $45,062.87, with unknown assets scheduled at about an equal amount, which is considerably less than the scheduled liabilities of approximately $160,000. Judge Thompson, in the United States District Court, today confirmed the sale of the company's assets.

Allen Company to Make Car

FOSTORIA, O., May 17—The organization of the Allen Motor Car Co., with an authorized capital of $500,000, has been completed and the announcement is made that a car will soon be manufactured in Fostoria and placed on the market which will sell for about $1,350. The organizers of the concern are E. W. Allen, W. O. Allen, J. E. Wright, M. A. Thomas, O. P. Bernhart, George E. Schroth, Grayton Baker, R. J. Christy and H. C. DeRan.

To Make More Gasoline in Kansas

TOPEKA, KAN., May 17—A big increase in the output of gasoline from the tar stills of the Standard Oil Co. of Kansas, located at Neodesha, Kan., will mean a considerable decrease in the price of gasoline in this territory, according to Earl W. Evans, attorney for the company. The concern has just secured permission to increase its capital stock from $1,000,000 to $2,000,000, and will make extensive improvements in its plant, expecting to make it the largest refinery in the world. The largely increased production of gasoline, if it reduces the price, will prove a boon to automobile owners, who have recently been compelled to pay more than formerly for their fuel.

Powerene—a New Automobile Fuel

FINDLAY, O., May 19—A new product made from the by-product of natural oil wells, which has hitherto been considered useless, has been discovered by Dr. J. W. Rae and Reece Lockwood, of Bowling Green, O. It is claimed by the discoverers that their new product will do away entirely with gasoline for motor power purposes. The new discovery will be called Powerene. It is said that it can be manufactured for half the cost of gasoline and that it will give more energy than a like amount of the latter liquid. Its explosive power is much higher and it does not leave as great a deposit of burnt carbon, on account of the new stuff being less carbonaceous than gasoline.

On a trial run from Bowling Green to Tiffin, 84 miles, the cost was 36 cents. The stuff can be easily manufactured for 13 cents per gallon.

MILWAUKEE, WIS., May 17—The Acetylite Gas Co., of which Percy C. Avery, well known in the automobile illuminating field of America and Europe, is president and general manager, has established a plant in Milwaukee, where it will carry on its work, which includes the manufacture and filling of gas tanks for pleasure cars and trucks. Experiments are being completed with a new form of acetylene gas which may be used as fuel in motor car engines, but Mr. Avery is not yet ready to make public the details of the product. By a secret process the Acetylite company has developed an acetylene gas which gives a flame of intense white or bluish light, similar to the light of electric lamps. The new fuel is a development of this gas process.

Court Holds Acetylite Does Not Infringe

MILWAUKEE, WIS., May 17—The United States Court for the Eastern District of Wisconsin, Milwaukee, has dissolved the injunction issued against Percy C. Avery and George F. Burnham of Milwaukee in 1910, on petition of the Prest-O-Lite Co., in consequence of the recent decision of the United States Court of Appeals that the patent had expired in 1910, and further, that the gas tank and process of the defendants did not infringe.

Smith-Haines Enjoined from Using "Yale"

NEW YORK CITY, May 20—Smith-Haines, who sold locks under the name Yale without being empowered to do so by the Yale & Towne Mfg. Co., of this city, were enjoined from continuing this practice by Justice Geo. C. Holt, of the U. S. District Court, Southern District of New York.

Market Changes of the Week

The metal markets this week experienced quite a few important changes. Tin slumped to $47.88 per 100 pounds at a loss of $1.12 in price for the week, while both coppers dropped in prices, electrolytic $.00 1-5 a pound and Lake $.00 1-20. Antimony on Wednesday dropped to $.07 1-2 per pound, a difference of $.00 1-8 from the preceding week. Bessemer steel dropped to $28.00 a ton, a lowering of $1.00, while open-hearth steel experienced a drop to $28.50, a reduction in price of $.50 per ton. Lead remained quiet but steady, calling at $4.35 per 100 pounds. Cottonseed oil at the close of the week held steady in price, and again reflected the tone of the lard market, which showed no material change in actual prices, but with an undercurrent of steadiness. A gradual rise from $6.89 on Wednesday to $7.06 on Tuesday showed at the closing an increase of $.17. Domestic scrap rubber remains in a steady position. A fair demand is being received from reclaimers and a somewhat larger export movement has been noted of late. Stocks seem to be comparatively small. On call at the New York market, automobile tire scrap was selling at $.10 a pound.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Change
Antimony, lb.	.07½	.07½	.07½	.07½	.07½	.07½	.....
Beams & Channels, 100 lbs.	1.61	1.61	1.61	1.61	1.61	1.61	.....
Bessemer Steel, ton	28.00	27.00	27.00	27.00	27.00	27.00	.....
Copper, Elec., lb.	.15 7/10	.15⅝	.15⅝	.15 7/10	.15 7/10	.15 5/11	— .00⅗
Copper, Lake, lb.	.15¾	.15¾	.15¾	.15¾	.15¾	.15 7/10	— .00 1/20
Cottonseed Oil, lb.	6.89	6.95	6.95	6.95	7.00	7.06	+ .17
Cyanide Potash, lb.	.19	.19	.19	.19	.19	.19	.....
Fish Oil, Menhaden, Brown	.34	.34	.34	.34	.34	.34	.....
Gasoline, Auto, 200 gals.	.22¼	.22¼	.22¼	.22¼	.22¼	.22¼	.....
Lard Oil, prime.	.95	.95	.95	.95	.95	.95	.....
Lead, 100 lbs.	4.35	4.35	4.35	4.35	4.35	4.35	.....
Linseed Oil.	.48	.48	.48	.48	.48	.48	.....
Open-Hearth Steel, ton	28.50	28.50	28.50	28.50	28.50	28.50	.....
Petroleum, bbl., Kansas crude	.88	.88	.88	.88	.88	.88	.....
Petroleum, bbl., Pa., crude	2.50	2.50	2.50	2.50	2.50	2.50	.....
Rapeseed Oil, refined	.68	.68	.68	.68	.68	.68	.....
Silk, raw Italy.	....	4.35	....	....	4.35	4.35	.....
Silk raw Japan.	....	3.70	....	....	3.70	3.70	.....
Sulphuric Acid, 60 Baumé	.90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	49.00	48.05	48.00	48.88	48.00	47.88	—1.12
Tire Scrap	.10	.10	.10	.10	.10	.10	.....

Massachusetts Truck Bill Is Reported Back

Despite Opposition of Automobile and Business Men, Committee Brings $5 a Ton Bill Up Again

BOSTON, MASS., May 17—Despite all the arguments made against the truck bill by men of ability in different lines, and with no one representing the Highway Commission appearing in favor of it, the Committee on Roads and Bridges of the Massachusetts Legislature reported back the same bill calling for $5 a ton last Tuesday. It was evident from the questions asked by the members of the committee that they could not be convinced but what the motorists were wrong and the Highway Commission was right. But the fight will be kept up. If it passes the Senate a fight will be made in the House against it.

Massachusetts to Test Double Tax

BOSTON, MASS., May 19—Plans are now being formed in this city to test the constitutionality of the Massachusetts motor law instead of waiting for the outcome of the test case that the American Automobile Association is going to take to the United States Supreme Court. In the New York law all other taxes are exempted in lieu of motor fees, while here motorists pay personal property taxes as well as the registration tax, and the latter gives them no special privileges to go where horse-drawn vehicles are not allowed to go, but, on the contrary, they are restricted on many roads; while also other users of the highways pay no taxes except on property value.

Essenkay Products Change Hands

CHICAGO, ILL., May 19—*Special Telegram*—The Essenkay Products Co., 1125 West Thirty-seventh street, Chicago, has taken over all the business and the rights of the Essenkay company. The latter concern was the original promoter of Essenkay, a tire filler, which became fairly well known all through the country. Instead of using distributing agencies as before, the new company will introduce the plan of having supply houses and garages handle the filler.

NEW YORK CITY, May 17—The Manhattan Automobile Club, Inc., has opened its clubrooms at 222-224 West Fifty-ninth street to its members. A smoker is to bt given in the near future. The restaurant in the building has arranged to supply the members with meals a la carte.

Warner Announces New Clutch

MUNCIE, IND., May 17—The Warner Gear Co., of this city has added to its extensive line of automobile parts, a new enclosed clutch. The clutch, their model K-12, is of the dry-plate multiple-disk type, and is adaptable to the unit constructions of motors. The clutch housing does not run with the flywheel, but is stationary, being bolted to the motor housing.

The disks are of steel, faced with Raybestos. The drive is taken on hardened steel studs and hardened keys. All bearings are of the ball type.

Chicago's Municipal Underground Garage

CHICAGO, ILL., May 21—This city is planning a mammoth garage which will extend thirteen blocks along Michigan avenue, from Randolph street to Park Row, run under the surface of Grant Park and will house more than 2,000 automobiles. When completed it will be the largest garage in the world. The plans, drawn up by J. J. Reynolds, engineer of the harbor and subway commission, have been sent to the South Park Commissioners for their consideration. Whether they will be approved or rejected depends upon the action of the park board, which has sole jurisdiction over Grant Park. The estimated cost is $1,250,000. According to the present plans the garage will be constructed in sections, each section to accommodate 225 cars, with the cost of construction estimated at $125,000. Each section will be built between two east and west cross streets. The material specified in the plans is reinforced concrete, insuring permanence and proof against fire, and the roof will be covered with soil, so as to make a grass plot as at present. The cars will enter at one roadway and go out another, so that traffic will be in one direction except when a machine is backing out of its stall. The stalls, to be 16 feet long and 8 feet wide, will be arranged for the easiest entrance and exit.

Americans Lose by Slow Delivery

WASHINGTON, D. C., May 17—There are 2,000 automobiles in the republic of Uruguay, according to a recent official report. Of this number 1,300 are licensed in Montevideo and the remainder scattered throughout the country. Cars are entering the custom house at the rate of fifty a month. About half of the cars in use are of American manufacture. American cars are declared to be the more popular, but owing to the delay in delivery many orders are placed in Europe, where, it is claimed, shipment is made more promptly.

Vaughn Car Co. Working at Kingston

NEW YORK CITY, May 20—The Vaughn Car Co. has taken over the Kingston, N. Y., factory of Wyckoff, Church & Partridge, Inc., now bankrupt, and there will build a six-cylinder car, the Vaughn, which will retail at not more than $2,500. The officers of the company are: A. B. Cordner, president; Orlando Weber, vice-president; H. M. Johns, treasurer; Ernest S. Partridge, secretary and sales manager; Chester Griswold, consulting engineer.

Commercial Makers Plan Combination

NEW YORK CITY, May 20—The removal of the factory of the Lansden Co., of Newark, N. J., to Allentown, Pa., which has been announced here today, means not only that this company will considerably increase its capacity after having taken a one-story building having some 7,000 square feet, but it foreshadows a more important movement. The building which the Lansden Co. will use for the Allentown factory, belongs now to the Webb Fire Engine Co. This company, as well as the Maccarr Co., also of Allentown, are expected to combine with the Lansden Co. will use for the Allentown factory belongs now to the Webb manufacturer of self-propelling fire-fighting equipment and the Maccarr company makes a 1,500-pound wagon.

CHICAGO, ILL., May 17—W. T. Tennant, of Tennant Motors, Ltd., Chicago, agents for Simplex and Henderson, has been made vice-president of the Stewart Speedometer Corp.

NEW YORK CITY, May 20—On June 1 R. W. Hutchinson, advertising manager of the International Motor Co., will leave that company. So far he has not announced his future plans.

FINDLAY, O., May 19—R. K. Johnston has been retained to take the management of the manufacturing end of the Bowling Green Motor Car Co., Bowling Green.

Pedestrian Has Prime Right of Way

MEMPHIS, TENN., May 17—That a passenger leaving a trolley car has the right of way over an automobile has been decided in the U. S. Circuit Court of Appeals for the Sixth Circuit. Robert W. Parks, after leaving a street car and trying to gain the sidewalk, was struck by a cab of the Taxicab Company of this city. The latter, in its defense brought up in reply to the individual's damage action, argued that the accident was due to contributory negligence of the pedestrian, but the court ruled opposite and gave judgment for the plaintiff.

DETROIT, MICH., May 19—The Downing-Detroit Motor Co. is bringing out a racy-type design of cycle-car. The power plant consists of a 10-12-horsepower motor of long stroke. One chassis will be produced of standard tread and wire wheels, with a choice of either single or tandem seats. Arrangements are being completed to produce these cycle-cars in large numbers.

Practice for 500-Mile Race Is Under Way

Nearly All Drivers Are Tuning Up Their Racers at Speedway—Foreign Cars Turn Laps in 1:41

INDIANAPOLIS, IND., May 19—Those who have been watching the practice at the Indianapolis Motor Speedway are predicting that the average speed of the 500-mile race to be staged May 30 will be something less than 80 miles per hour, but over last year's mark. Among those who have made this prediction is Joe Dawson, who won last year's race at an average speed of 78.72 miles per hour. It is Dawson's opinion that, although some of the cars entered are capable of 100 miles an hour or better, they will be unable to maintain within 20 miles of that average on the local Speedway.

The Peugeots, driven by Goux and Zucarrelli, have turned several laps in 1:41, which has been the best mark since practice began in the present try-outs. The best lap last year during the race was 1:39 and many of the drivers are confident of equalling this before the race. Both Goux and Zucarrelli are delighted with the course. They say that, while they do not believe the course is capable of as great speed as Brooklands, they find driving less fatiguing here than on the English track.

The three Isottas will arrive tomorrow and will begin practice at once. Tetzlaff, one of the Isotta drivers, has been here several days, impatient to begin work. Grant and Trucco will be on hand when the Isottas arrive.

Gil Anderson and his Stutz are attracting a lot of attention during the practice. Anderson, a day or so ago, turned four laps, or 10 miles, in 6:57, which is said to be the best time for the distance that has ever been made on the course. Anderson has done several laps in 1:44 and his team mate, Herr and Merz, have also hit this figure repeatedly.

One of the criticisms of the Peugeot drivers has been that they have been trying to maintain approximately the same speed on the turns that they do on the straightaways.

Bob Burman in his Keeton is doing some steady and consistent work. Burman believes his car is ready for the race, although he expects to do some faster laps during practice than he has to date. His best lap has been 1:42 3-4, and he has turned other laps in 1:43 and 1:45.

The Mercer team, De Palma, Bragg and Wishart, have been at work several days. They have clipped off some laps at 90 miles an hour and their cars are working nicely.

Clark has practically overhauled his Tulsa and is now ready for some stiff practice. He found on arriving here that a number of changes in the car were advisable. Liesaw has been making some changes in his Anel, and Endicott has been making a few changes in his Case. No opportunity has been given thus far to show what the Case, Tulsa and Anel can do, but it is expected they will begin pretty active work by tomorrow.

The Fox Special, or Gray Fox, as it is being called by the railbirds, is being given a good work-out by Wilcox. Thus far Wilcox has been content to take the stiffness out of his motor, but by tomorrow or Wednesday he expects to begin showing some speed. Endicott and his Nyberg are not yet on the track. Reports have been received, however, that in practice work on country roads, Endicott has been able to get 92 miles an hour out of his car. The car will be on the track some time this week.

Harry Goetz has been selected as team manager for Billy Knipper, who is to drive the Henderson in the race.

Disbrow and Nikrent have been on the track several times with their Case cars, but have not tried to do much better than 1:50 for a lap. They have been trying to determine the size gear wheels they will need and, incidentally, to become thoroughly familiar with the track before attempting any fast work.

Johnny Jenkins has not done much actual practice with his Schacht, but has made a few trials and has made a few minor changes as a result. Mulford and his Mercedes will be here within the next day or two.

The Speedway management has announced the appointment of P. P. Willis as assistant director of contests at the Speedway. He will thus be first assistant to Charles Sedwick.

A new plan of signalling the drivers has been adopted. Heretofore the starter has had to flag the cars from the track. For this year a trolley arrangement has been built from the judge's pagoda to the paddock stand across the track and the flags will slide down to the center of the track. At the end of each driver's 199th lap a green flag will notify him that he has begun his last lap.

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INDIANAPOLIS, IND., May 21—*Special Telegram*—F. L. Adams has withdrawn the Smada entry from the 500-mile race, being unable to get the car ready. Pennebaker and Nyberg have arrived. The unknown entry No. 32 is a Shambaugh, entered by Charles Shambaugh, of Lafayette, Ind., who entered a car last year but withdrew it before the race. The motor is a special four-cylinder type built by Shambaugh.

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NEW YORK CITY, May 17—Albert Guyot arrived today on the steamer *La Provence* in company with H. L. C. Crossman, who will act as mechanician with him at Indianapolis on May 30. Guyot's Sunbeam racer has arrived and has been shipped to Indianapolis. Guyot has had much experience as a driver and is expected to give a good account of himself in the 500-mile race.

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A. A. A Authorizes Pennebaker Entry

NEW YORK CITY, May 20—At a meeting of the Contest Board held at A. A. A. National Headquarters, Friday, May 16, the following action was taken:

The application for reinstatement to good standing of Theran S. Duby, of St. Louis, Mo., who was on December 14, 1911, disqualified and suspended until December 14, 1913, for participation in an unsanctioned track meeting at DeWitt, Iowa, on September 15, 1911, was considered and Mr. Duby was reinstated to good standing. Charles Shambaugh was also reinstated.

The ineligibility of Ernest J. Delaney, of Jackson, Mich., driver of the Cutting car in the 1910 500-mile race at Indianapolis, who took part in an unsanctioned track race at Milford, Iowa, August 14, 1912, was, upon his formal application, removed.

The application of R. H. Pennebaker, of Memphis, Tenn., who drove in the unsanctioned race meet held at the Tri-State Fair Ground's Track, Memphis, Tenn., July 4, 1912, was favorably considered and the acceptance by the Indianapolis Motor Speedway of his entry of a Pennebaker Special in the coming 500-mile race was authorized.

The request of C. V. Dunivan, of Memphis, the promoter of the meet in question, for removal of his ineligibility was considered, but his application was finally denied.

The application of E. V. Rickenbacher, of Des Moines, Iowa, for reinstatement to good standing was denied.

Upon satisfactory compliance with Rule 78, the board allowed and accepted the claim for record of Earl Cooper, driving a Stutz car, at the County Fair Grounds track, Fresno, Cal., February 10, 1913, as follows: 200 miles—3 hours 27 minutes 23 4-5 seconds.

The performance of Barney Oldfield, driving the front-drive Christie, in a 1-mile time trial at the new Bakersfield, Cal., 1-mile dirt track in 46 2-5 seconds, was not accepted as a new record pending the submission to the board of more complete data as to the construction and method of operation of the Pendleton automatic timing device, with which the trial was timed.

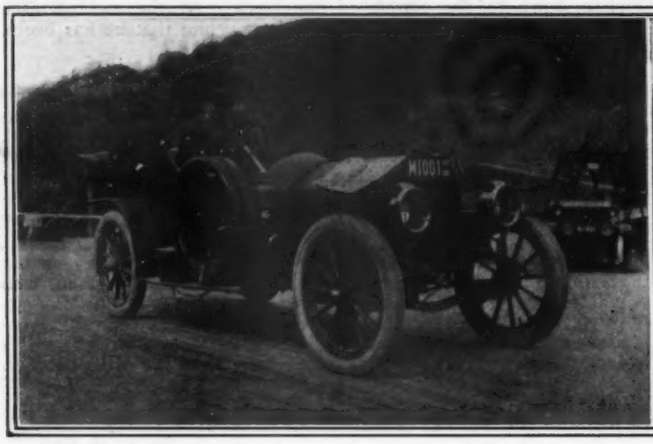
The sworn affidavits of E. H. Pendleton, chief timer; C. A. Colby, referee, and S. L. Mitchell, A. A. A. representative, to the correctness of the time was furnished, as well as the certificate of Civil Engineer J. L. Evans as to the distance, but the Contest Rules provide that no claim for record of 1 mile or under and up to 5 miles can be considered unless the timing is done by an automatic electrical or mechanical timing device *"approved by the board and the actual printed evidence taken by such device submitted to the board."* If these requirements are satisfactorily met the new mark will supersede the present record of 47 85-100 seconds made by Bob Burman in the Blitzen Benz II at Brighton Beach, N. Y., September 7, 1912.

The application of S. W. Gumpretz for sanction for automobile races in conjunction with auto polo games at Brighton Beach May 30 and 31 was denied.

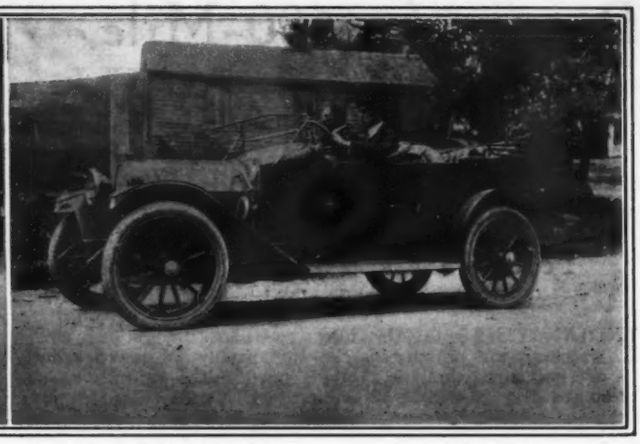
The following summary of automobile contests for which official sanction has been issued in 1910, 1911 and 1912 was submitted by Chairman Schimpf:

	1910	1911	1912	Scheduled for 1913
Speed events (track and speedway)	88	60	97	12
Beach races	4	4	2	1
Road races	5	8	8	5
Hill climbs	20	14	6	3
Reliability	49	26	17	11
Non-stop tests and trials	..	3	2	..
Totals	166	117	132	32

The number of events scheduled at this time for the coming year shows the following increase over the number of events scheduled a year ago: Speed events, three; road races, two; reliability, four; hill-climbs remain the same and there is a loss of one in beach races, the Old Orchard, Me., meeting not being scheduled for 1913.



Winning National, which finished highest almost throughout



Paige-Detroit, which had the highest score in fuel economy

National Grand Winner in Catskill Run

Final Standing Catskill Tour

No.	Name	Price	Reliability	Hill-Climb	Economy
1	Mercer	$2,500	15	2:38.4	.260
3	National	2,600	0	3:46.8	.1628
5	Alco	6,000	0	3:23.5	.188
7	Ford	525	0	4:20.4	.206
11	Ford	600	0	5:16.2	.213
15	Mercer	2,500	0	Stalled	.196
17	Pathfinder	2,000	137	5:16.4	.180
20	American	2,750	0	3:42.6	.197
22	Oakland	1,215	0	5:02.8	.204
24	Paige-Detroit	1,275	0	3:52.2	.1627
34	Briggs-Detroit	900	148	No	.175

NEW YORK CITY, May 15—The combined Catskill reliability run, hill climb and economy test promoted by W. J. Morgan, the veteran promoter of contests, and conducted under the auspices of the newly-formed Motor Dealers' Contest Association, reached a successful conclusion this evening, all eleven of the competing cars which checked out yesterday noon having gone through the strenuous day and a half of competition in good shape.

The cars traveled 262.8 miles. The first afternoon's run to Newburgh was 64.7 miles, and in addition to testing reliability was also an economy contest, which was won by a Paige-Detroit with a percentage figure of .1627 obtained by dividing the weight of the vehicle with passengers into the ounces of gasoline used for the distance. The National was just beaten in the fourth place of decimals, its figure being .1628.

The second day's run was 198.1 miles, divided into forenoon and afternoon runs. The forenoon run was from Newburgh to Haines Falls in the Catskills, 63.2 miles. This occupied but a part of the time, the remainder being taken up with a hill-climb in which each vehicle had to compete, the driver alone riding. The hill was 1.1 miles long, very winding, with grades exceeding 20 per cent. and with a great many water breakers across the roadway. The winner of the climb was Mercer runabout No. 1 which made a remarkable climb in 2:38 2-5, or 44 seconds faster than the next competitor, which was the Alco touring car with a figure of 3:23.5.

The afternoon run of the second day was 135 miles, over good roads back to New York by way of Newburgh and Tuxedo.

When the eleven contestants checked in at the finish eight had perfect road scores. These were: No. 3 National, No. 5 Alco, No. 7 Ford, No. 11 Ford, No. 15 Mercer, No. 20 American, No. 22 Oakland and No. 24 Paige-Detroit. Each of these received a certificate of performance.

Besides a winner in the hill-climb, a winner in the fuel economy and winner or tied scores in the reliability, the rules called for a grand winner to be the contestant averaging best in all three contests. In deciding on the grand winner 600 points were allowed for a perfect score in reliability, 200 points to the winner of the hill-climb and 200 points to the winner of the fuel test. The other contestants were rated on a percentage basis proportional to their showing compared with the winner in each contest. In this grand classification No. 3 National was adjudged first with a rating of 938 points out of a possible 1,000. The Paige-Detroit was second with 936 points; the Alco third, 928, and American fourth with 907.

Under the rules each contestant carried an official observer throughout the contest, excepting in the hill climb when the driver rode alone. The reliability rules called for penalities for being late in checking in at controls, also for work done on the car when on the road such as repairing or replacing damaged parts. Motor stops were not penalized and there was not any technical inspection of the cars at the finish or any tests of brakes, clutches and gearboxes.

The economy contest proved one of the most interesting, in that the method of determining the winner gave the small car practically an equal chance with the largest machines. It would be difficult to select a better 65 miles for a fuel test. There is not a level mile in the entire stretch and just beyond West Point the contestants climbed Crow's Nest mountain, an ascent of 2 miles, with many hairpin turns so sharp that some of the larger cars had to reverse in order to get around the turn. In addition to sharp curves the road surface is soft dirt and there are water breakers every 50 feet, which compelled the cars to slow down. During the other part of the test there were many stiff climbs and much poor road, wornout macadam filled with pot holes 1 foot in diameter and often 6 inches deep. The speeds of travel were 12 miles per hour for cars under $800, 13.5 m.p.h. for those costing $800 to $2,000; and 15 m.p.h. for those costing above that amount. The cars were weighed previous to the start. The following are the results:

No.	Car	Weight	Gals.	Ounces	Percentage	Final standing	Miles per gallon
24	Paige-Detroit	3650	4	82	.1627	1	14.0
3	National	4200	5	44	.1628	2	12.1
34	Briggs-Detroit	3080	4	29	.175	3	15.3
17	Pathfinder	3690	5	27	.180	4	12.4
5	Alco	5780	8	65	.188	5	7.6
15	Mercer	3250	5	0	.196	6	13.0
20	American	4900	7	71	.197	7	8.6
22	Oakland	3350	5	44	.204	8	12.1
7	Ford	1880	3	3	.206	9	21.5
11	Ford	2400	4	0	.213	10	16.2
1	Mercer	3050	6	32	.260	11	10.4

These results show that the Ford runabout was the only contestant to exceed 20 miles to the gallon, making 21.5, a good showing for the roads. The method of determining the winner, namely dividing weight into gasoline used favors the heavier cars

slightly in that the load carried is often better proportioned to the motor capacity than in light vehicles with fair-sized motors.

The winning Paige-Detroit has a four-cylinder motor 4 and 5 inches bore and stroke and uses a Stewart carbureter and Bosch magneto. No. 3 National, which finished so close a second, used a Schebler carbureter and Bosch magneto. Its cylinder sizes are 5 by 5 11-16. It has four cylinders.

The result of the hill-climb was practically a foregone conclusion from the start as Driver Ferguson has had much experience in handling a racing car. His roadster was stripped of fenders, but handicapped by a leaky radiator. He handled the machine well on the dangerous curves and over the water breaks. For timing purposes a telephone system connecting the starting line with the finishing line was used.

So far as the reliability run was concerned the eight perfect-score contestants had little trouble. The roads were dry from start to finish and not one of them had any difficulty in maintaining the schedule, which on the second day was 16 miles per hour for cars under $800; 18 miles per hour for cars costing up to $2,000 and 20 miles per hour for cars selling at over that price.

The three to receive road penalties were penalized not for defects in construction but for minor reasons. No. 1 Mercer developed a leaky radiator the first day and was penalized for taking on water outside of controls. No. 17 Pathfinder got all of its points but one for dirt in the gasoline line; and No. 34 Briggs-Detroiter discovered a piece of steel in the timing gears and also broke a torsion rod.

Revised and Corrected Score Grand Winner Catskill Tour

No.	Car	Reliability	Hill-Climb	Economy	Total
3	National	600	139	199	938
24	Paige-Detroit	600	136	200	936
5	Alco	600	155	173	928
20	American	600	142	165	907
7	Ford	600	121	157	878
22	Oakland	600	104	159	863
11	Ford	600	100	152	852
1	Mercer	525	200	125	850
15	Mercer	600	000	160	760
17	Pathfinder	—85	100	180	95
34	Briggs-Detroiter	—140	000	186	46

In determining the grand winner a total of 1,000 points was allowed, of which 600 were given to the perfect score reliability, 200 to the winner of the hill-climb and 200 to the winner of the economy test. Each of the other contestants was awarded points in proportion.

In the reliability each point penalty against a contestant was equivalent to a deduction of 5 points from the 600 points allowed.

In the hill climb the points allotted each contestant after the winner were obtained on a percentage basis in which the winner was taken as standard. The fraction used had as its numerator the time of the winner and as its denominator the time of the other contestant, the time in each case being reduced to fifths of a second.

In the economy test the points allotted each contestant after the winner, were obtained on a percentage basis as in the hill climb. The fraction used had as its numerator the percentage given the winning car in the fuel test and as its denominator the percentage of the other contestants.

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May Have 1913 Fairmont Park Race

PHILADELPHIA, PA., May 17—The preliminary move looking toward the restoration to the racing calendar of the Fairmount Park 200-mile road race was taken yesterday, when a resolution requesting the Fairmount Park Commissioners to act favorably upon the Quaker City Motor Club's petition for resumption of the event was introduced and unanimously passed by both branches of City Councils.

Whether there will be a 1913 race or not is now up to the commission, as that body, which last year abolished it, has the sole power of restoring it.

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Expect 100 Glidden Tourists

MINNEAPOLIS, MINN., May 19—One hundred automobiles are expected to take part in the Twin City-Glacier National Park Tour for the Glidden trophy, which will start from this city on July 11 and will arrive at the park on July 19. The distance covered by the tourists will be 1,233 miles and they will pass through the states of Minnesota, North Dakota and Montana. A hotel train will travel shortly ahead of the tourists and will carry accommodations for sleeping and eating. With it a repair parts truck will travel, so that broken parts can be easily replaced in short order. Besides, a newspaper will be published, from day to day, with the assistance of the correspondents of papers participating in the tour.

The itinerary follows: July 11, leave Minneapolis; noon control at St. Cloud; night stop at Alexandria, Minn.; 144.4 miles. July 12, leave Alexandria; noon stop at Fergus Falls, Minn.; night stop at Fargo, N. D.; 123.8 miles. July 14, leave Fargo; noon stop at Grand Forks, N. D.; night stop at Devil's Lake; 194.6 miles. July 15, leave Devil's Lake; noon stop at Rugby, N. D.; night stop at Minot, N. D.; 135.6 miles. July 16, leave Minot; noon stop at Stanley; night stop at Williston, N. D.; 136.8 miles. July 17, leave Williston; noon stop at Poplar, Mont.; night stop at Glasgow, Mont.; 163.9 miles. July 18, leave Glasgow; noon stop at Malta, Mont.; night stop at Havre, Mont.; 156.1 miles. July 19, leave Havre; noon stop at Shelby, Mont.; night stop at Glacier National Park; 178.0 miles.

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NEW ORLEANS, LA., May 18—An offer of $5,000 as a prize for a 200-mile automobile race, which is to be the feature of the Galveston beach meet set for July 28, 29 and 30, is expected to draw enough of the stars in the game to make the event a great drawing card. In addition $9,000 in other prizes is arranged. Capt. J. W. Munn will have charge of the races. The meet will be a part of the Cotton Carnival.

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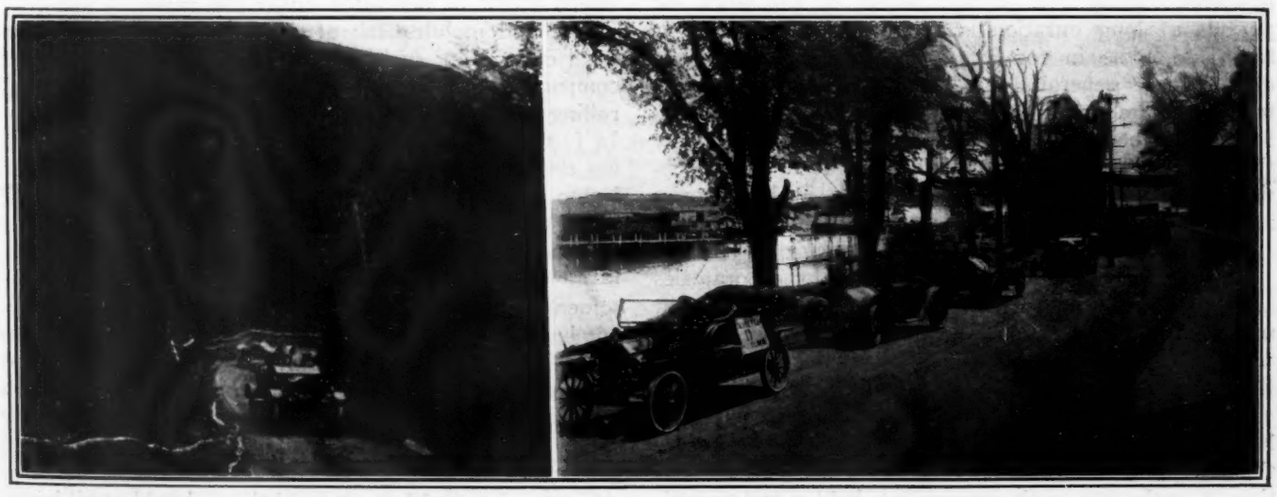
DES MOINES, IA., May 17—The route of the fourth annual Little Glidden tour of the Iowa Automobile Association has already been tentatively agreed upon. The tour will leave Des Moines on June 23 and will make a day run over the state, covering in all a little over 1000 miles. Already more than thirty cars have been entered. This year a new departure will be attempted in that there will be two classes, one of factory cars, and another for owner-driven cars. The pathfinder for the tour will leave Des Moines this week.



On a beautiful mountain road in the Catskills

Contesting cars checked in at Newburgh on Hudson

The Automobile

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Duration Motor Tests

WITH the completion of the 300-hour Packard motor test by the Automobile Club of America laboratory a movement has been instituted in this country which it is hoped will be carried forward and which, if properly directed, will do much to raise the efficiency of motors and also do valiant work in furnishing information concerning power plants which the American public, a good percentage of it at least, has been waiting for. Motor testing on the block for periods of long duration is new in America but it is bound to come in for increasing prominence because of the more general use of the dynamometer in factories and the wave of education on dynamometer testing that is being engendered at present. Only a year ago the Society of Automobile Engineers centered attention on the problem of motor testing in laboratories and at present a committee is active in this society in furthering this movement among the factories.

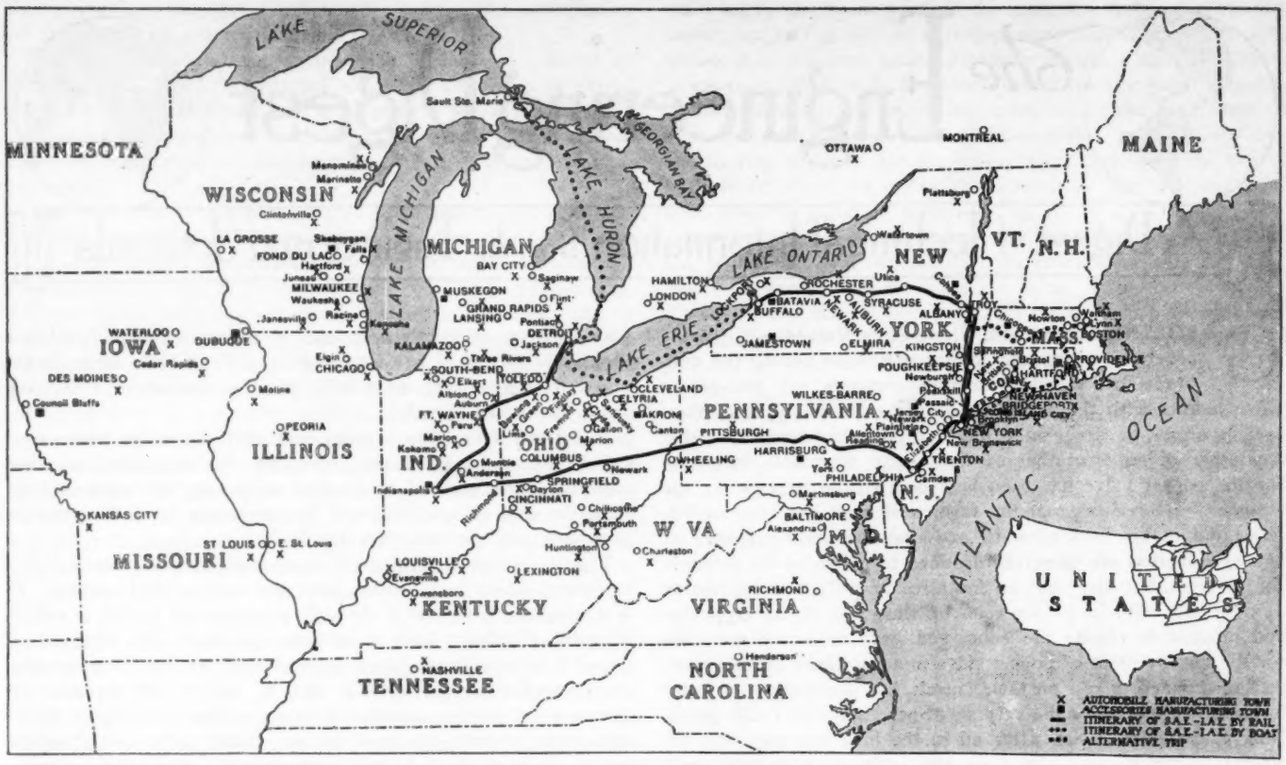
Duration motor tests made officially by laboratories not directly connected with any factory must be brought to some definite basis for comparison purposes otherwise these tests will be meaningless to the general public and the only purpose they will serve will be in enabling some factory to talk officially to the public in language that it desired to talk to such public before the start of the test. If there is not some basic regulation on such tests, each concern can hold a test according to is own whims, whims perhaps largely dictated by merchandising considerations. Permit such and you will effectually kill duration tests before they have grown out of their swaddling garments. Motor tests, made officially by apparently disinterested laboratories or technical schools, must aim at serving to elevate the general plane of engineering testing rather than being factors for other uses.

There is no reason why a few basic essentials might not be the same in standardized duration tests. Why should not the motor be required to show the official S. A. E. horsepower rating from start to finish. This is generally, in fact nearly always, the advertised rating, and because of this it is but logical that the motor under test should average this horsepower output from start to finish, at the piston speed at which such horsepower is supposed to be generated under the formula used in calculating. Making this one factor alone standard, it will give the public a basis of comparison which it must have if such tests are to continue. Let each factory set its own power rating and you will have at the end of the year a meaningless jumble of figures.

You cannot stop the public from comparing. It is one of the mental processes in the acquirement of knowledge. You cannot get a definite concept of anything without passing through the process of comparison.

Now that duration tests have been started it is to be hoped that efficiency and power tests will be started also. There should be a differentiation between them. In a duration test it is understood that the motor is not developing its maximum power, in power tests there should be a load much in excess of the official horsepower rating of the motor. Instead of a motor in a power or efficiency test pulling but its S. A. E. rating it should be compelled to pull 25 or 30 per cent. more than its rating for any period of hours that the maker might desire. Efficiency tests should also go further and show the frictional losses, the amount of power necessary to drive the rotating and reciprocating parts; the volumetric efficiency at various speeds and many other facts. In such a power or efficiency report every detail should show, whereas in a pure duration test made with a much lower horsepower load the horsepower generated, crankshaft speeds and fuel and oil consumption are practically all that should be given in addition to the general story of any alterations, adjustments, etc., which might be permitted under the rules.

The Automobile Club of America is to be congratulated on starting such a series of tests and the Packard company is also to be congratulated for setting the ball rolling. It is to be hoped that others will soon follow. In future tests greater care should be taken in conducting the test. The present testing laboratory of the club is too small to admit the visiting public. The testing room should be three times as large. The motor under test should also be better protected from visitors. There is no reason why a motor being tested should not be screened off, making it absolutely impossible for anyone but the officials connected with the test to get within 6 or 8 feet of it. Whenever the public is permitted to close in and lay hands on a motor undergoing such a test there is sure to be a storm of criticism. Many details will be misinterpreted and misunderstandings will arise. In such a test it is desirable to have duplicate sets of record keepers; and there should at all hours be some leading test official in charge.



The above map, which is similar to the one presented to the Society of Automobile Engineers and their English visitors, the Institute of Automobile Engineers, for use on their trip by THE AUTOMOBILE, shows the section of the United States and Canada in which are located practically all of the automobile and accessories factories. The itinerary of the engineers is clearly shown, the journey by rail in black and that by boat by the dotted lines, while the square dots indicate the alternative trip through New England. The cities marked "X" are automobile or motor truck manufacturing towns, while those marked with a square are accessory towns. The relative size of this section of the country is shown in the smaller map of the United States

Twenty-five English Engineers Sail for America

NEW YORK CITY, May 19—At a meeting of the entertainment committee of the Metropolitan Section of the Society of Automobile Engineers held here last night, the final details of the local program for the entertainment of the English engineers were closed. A cable has announced that twenty-five of the Englishmen were aboard the *Minnewaska* when she sailed last Saturday. The boat is expected to arrive in New York at about 10 a. m. Monday, May 26. In addition to the program which has been announced the committee has prepared a list of places which can be visited in the event of a rainy day or an interruption in the regular program. The places included in the list are as follows:

Brewster's body factory in Long Island City; Thomas A. Edison's plant in East Orange; New York Telephone Co.; Peter Doelger's brewery garage; Jacob Ruppert's brewery garage; Ward's bread factory; the New Grand Central Terminal; New York Edison Co.; General Vehicle Co.; American Express Co.

About a dozen starter manufacturers have consented to read 10-minute papers before the meeting on Tuesday night in the ballroom of the Hotel McAlpin and the discussion on these papers will be carried through after all the papers have been read.

The party includes four ladies. Those sailing are: T. B. Browne, president of the Institute of Automobile Engineers; T. C. Pullinger, Paisley, Scotland, and Charles Wheelers, London, members of the council of the Institute; Basil H. Joy, secretary of the Institution; and members, associate members and guests include: F. S. Bennett, London; C. A. Branston, Cambridge; H. Massac Buist, London; E. G. Davison, Cleveland; J. B. Ferguson, Belfast; J. Inglis Ker, Glasgow; E. C. Paskell, Birmingham; J. A. Prestwich, Tottenham; E. B. Wood, Bristol; Lucien Bollack, Coventry; E. Wooler, Bristol; Carl F. Benson, Coventry; J. B. Dunlop, Dublin; F. E. Filer, London; G. Gilbert Moore, Twickenham; Tom Norton, Llandrindod Wells; R. W. Smith, Redditch; T. Clarkson, Chelmsford; and Mesdames Pullinger, Wood, Browne, Clarkson and Mr. Smith, Jr.

Alexander Craig is managing director of the Maudslay Motor Co., Coventry, and has been connected with the industry since its inception. T. V. Pullinger is manager of the Arrol-Johnston Co. and has been long connected with the industry in France and England. F. S. Bennett is responsible for the Cadillac business in England. H. Massac Buist is a well-known journalist. Carl F. Benson is manager of the Humber works at Coventry. J. B. Dunlop is inventor of the pneumatic tire. T. B. Clarkson is designer of the Clarkson steam omnibus now being operated in London. R. W. Smith is managing director of the Enfield Cycle Co. J. A. Prestwich is constructor of the well-known J. A. P. motorcycle engines.

New England Electric Car Convention

BOSTON, MASS., May 21—The first New England convention of men identified with the electric field, comprising representative of central stations, makers of motor vehicles and allied interests, opened here at 1 o'clock yesterday afternoon at the Engineers' Club. It was attended by men prominent in all the lines from different parts of the country. W. H. Blood, Jr., former president of the Electric Vehicle Association of America, called the meeting to order and there were more than 100 on hand.

There were three sessions on the program, one yesterday afternoon, another last evening and a third this morning. The first session was given over to addresses and discussions under the heading "Electric Vehicle Progress." H. H. Rice, of the Waverley Co., Indianapolis, Ind., spoke on "The Growing Popularity of Electrics." Fred H. Kimball, of the General Electric Co., Boston, Mass., delivered an address on "New England as An Electric Vehicle Field," and President W. C. Anderson of the Anderson Electric Car Co., Detroit, Mich., spoke about "How a Control Station Can Develop Its Electric Vehicle Load." There were discussions after each paper.

The second session last night had "Salesmanship and Service" as the topics. E. R. Davenport, of the Narragansett Electric Light Co., Providence, R. I., spoke on "Constructive Criticism"; Louis Burr, of the Woods Electric Co., Chicago, Ill., had for a topic "Proper Selling of Electric Cars," and L. B. Wallis, of the Edison Electric Illuminating Co. of Boston, talked on "What Service Should the Central Station Furnish Owners of Electric Cars."

This morning the session was devoted to "Advertising." F. Nelson Carle, of the General Vehicle Co., Long Island City, N. Y., spoke on "Advertising the Electric Vehicle from the Manufacturer's Standpoint," and E. W. J. Proffitt, of Providence, R. I., talked on "The Electric Vehicle as an Advertising Proposition from the Central Station Standpoint."

The Engineering Digest

A Digest of Technical Information from the Engineering Journals

GASOLINE Motor with Plane Slide Valves.—When the progressive engineer studies specimens among the multitude of valveless motors—meaning all non-poppet valve motors with the exception of the standard types of two-cycle motors—he frequently finds it difficult to perceive that any other object than that of finding an acceptable substitute for the poppet valve has been kept consistently in view by the designer. He realizes that the fashion element has been unduly influential in his field of work and that the great majority of new-type motors are therefore destined to perish in the struggle for survival, but also that an imitative or a fashion movement of this kind, with its 95 per cent. of waste, so far as applicable and practicable results are concerned, was necessary not only for the improvement of poppet valve motors, whose makers were getting satisfied to rest on their laurels, but particularly in order to bring to the surface the very small percentage of really promising construction which after all in the long run pays for the waste and much more. In some few instances a definite technical object has actually inspired the designer before his creation took form, although more frequently a merely possible design took form first and its technical objects were discovered afterwards, or were worked into it by successive modifications.

These reflections are suggested by a description of the Neute motor presented by Henri Petit. It is not clear whether this motor exists on paper only or has been made and tested, nor whether its weight can be kept within the limits considered ruling for automobile motors. An estimate on the basis of the accompanying drawings must satisfy the reader on these points.

The object aimed at by Mr. Neute has been to incorporate in one type of motor the greatest possible number of the desirable qualities now found represented individually in all the different types and makes of automobile motors and, above all, to secure unfailing reliability. In the largest sense of this word it involves that every working part of the motor can be inspected, cleaned and dismounted, on the road as well as in the garage, as often as the man in charge of it may desire, in the shortest possible time, with the simplest tools and without possible disturbance of its adjustments—those of the valve timing especially.

It is a four-cycle motor. The piston works in an ordinary water-jacketed cylinder. The cylinders are cast in pairs, and each cylinder A has a port *a*, serving for the passage of both fresh and exhaust gases, and a lateral casing *b* in which the whole valve mechanism is contained. The inner wall *c* of this casing, adjacently to the water-jacket, is ground perfectly plane and smooth. A piece B called the distributer-box has on one side a large ground surface in contact with *c*, a recessed middle portion in which the plane plate C is slidably inserted, and it faces outwardly against two slide valves D and E which are plane and can slide one upon the other. The conduits *d*, for the fresh gas, and *e*, for the exhaust, are cast in this box B and merge into one in line with the port *a* leading into the cylinder. The position of B is determined vertically by flanges *f*, forming part of the cylinder casting, and laterally by a spline *g* located between the two cylinders of a pair. The box B does not touch the casing *b* at its lateral and upper edges, which are left rough, expansion being facilitated by this provision. Contact between B and the plane-ground outer cylinder wall *c* is secured by the coverplate F which also regulates the necessary play between slide-valves D and E. The intake and exhaust manifolds G and H are mounted upon F, and the latter is secured to casing *b* by eight bolts b^1. The carbureter I is hung from the intake manifold.

It follows from this arrangement that the valve mechanism can be examined by merely removing the coverplate, together with the parts secured to it after separating the exhaust tube from the exhaust manifold and the carbureter from the gasoline inlet pipe and the throttle control.

Plate C, which is termed the stopper-plate, has a vertical displacement of 10 to 15 millimeters, and only a single orifice. It is controlled from cam *h* through a tappet rod J with a roller. A spring K takes it back to its lower position. The slide valves D and E have each two ports to determine the flow of gases and are controlled by the rods L and M, which for the sake of clearness are merely indicated by their positions in Fig. 1, these rods being in turn governed by two eccentrics e^1 and e^3 which are keyed upon shaft N, 70 degrees apart. Shaft N is a two-to-one shaft run by silent chain from the motor shaft. The cam *h* for the control of the stopper-plate is formed (see Fig. 8) upon the cheek separating two of a pair of the eccentrics e^1 and e^3.

The function of the stopper-plate is to be interposed between the cylinder and the slide-valves, so as to isolate the latter completely from the explosion chamber at the proper periods and protect them from pressure and heat. The cam *h* is so shaped (see graphic schedule of the cycle of cam actions in Fig. 2) that the port *a* in the cylinder is always uncovered a little more by the stopper-plate, for induction or exhaust, than by the respective slide-valve plates, and as to hold the stopper-plate at rest in its highest position at the end of compression and during the working stroke.

The movements of slide-valves and stopper-plate are indicated in the diagrams composing Figs. 2 and 3. At the end of the period for gas admission (diagram 1), which takes place when ports *i* and *j* register, cam *h* begins to raise the stopper-plate, and the lower edge of its port is displaced across port *a* at the same rate of speed at which the slide H valve D is moved which regulates the closure of gas admission; only the port in the stopper-plate is slightly behind in this movement.

At period 2, while port *a* is completely closed, the plate C still has 2 to 3 millimeters left of its upstroke. At periods 3 to 5 (including the position shown in diagram 4), the latter just preceding the opening of the exhaust, the stopper-plate remains stationary, the acting portion of the cam being circular and concentric with the shaft N. When 5 is reached the plate is dropped by the cam and is taken to its lowest position by spring K. The expansion of the gas is at that moment almost completed.

With regard to the pressures acting against the movements of the stopper plate, it is noticed that from 1 to 2—during the admission—the plate has its largest displacement, equal to 4/5 of its total stroke, and that this is effected without any resistance; that from 2 to 3, during the compression, the displacement is small, amounting to 1/5 of the stroke and taking a relatively long time, while the resistance is small, being determined by a maximum pressure of ½ kilogram per square centimeter of the stopper-plate edge; that from 3 to 5 there is no movement and,

finally, that at 5 the spring action takes place under a resistance of about 4/10 kilogram per square centimeter.

The gas-tightness of the compression chamber is assured by the fact that, from the moment when the admission is closed and until the gas pressure ceases, the plate is pressed against the bottom of the distributer-box, where, moreover, as will appear later, the lubricating oil also contributes to the obviating of all leakage.

The mechanical conditions of this valve system are also particularly favorable. The frictions are of cast iron upon cast iron. The different pieces and walls engaged in the frictions are approximately of the same thckness and shape and undergo similar expansions and contractions by variations of temperature, so that the play once provided between the parts remains constant. The stopper-plate and the slide-valve plates are light of weight and perfectly guided, and the lightness of the slide-valve plates—weighing from 3/10 to 4/10 kilogram—admits of using control rods of corresponding lightness for operating them. These rods also work in an almost vertical position and exert no appreciable oblique pressures on the valve plates, so that it seems that they should last as long as the motor. With regard to accessibilty and easy dismounting, it is noticed that the stopper-plate is not jointed to its control but simply rests on it, like the valves in poppet-valve motors, the exact nature of the connection being shown in Figs. 5 and 6; also that the distributer is simply held between the outer cylinder wall and the coverplate without use of screws or bolts. and that the two manifolds are secured to the coverplate. No other tool than a single spanner or wrench is thus required for taking the whole valve mechanism apart or for mounting it. The only parts to be disconnected first are the carbureter from its control, the exhaust manifold from the exhaust pipe and the 8 bolts holding the coverplate F. The whole operation requires only a very short time—a few minutes for one familiar with the mechanism—as the details have been thought out with special reference to this high degree of accessibility. Even the guide of the tappet-rod for controllng the stopper-plate can be removed by first loosenng the bolt O (see Fig. 6) where after the whole rod can be lifted out and a single pin *t* holds the upper part of the control rod (Fig. 5) to the lower part J (Fig. 6). If it is desired to remove the slide-valve plates, it is not even found necessary to use a split-pin chaser to separate them from the control rods, as the relative movements of the two plates during operation of the mechanism is such that the spindles of the rod-knuckles cannot come out, one barring the way for the other, while each of them can be pushed out when the plates are separated. The working relations of these parts are shown in Fig. 7.

It is particularly worth noting that the valve adjustment cannot be changed by dismounting and remounting the parts and that it is unnecessary to drain the water from the jackets, to disconnect the gasoline manifolds, the carbureter or the cylinders.

A water circulation by thermo-syphon system is provided and ignition by magneto operated by silent chain in front of the motor.

The nature of the valve-mechanism in this motor further admits of instituting a motor-brake system by lodging an additional plate between the slide-valve plate E and coverplate F,

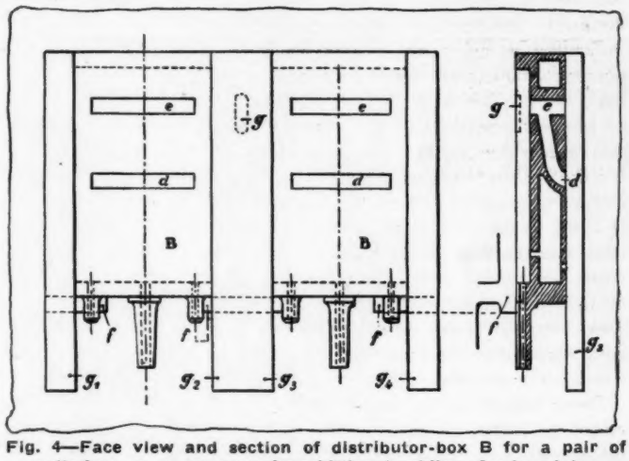


Fig. 4—Face view and section of distributor-box B for a pair of cylinders—g_1-g_4 are spurs for additional guiding of valve plates

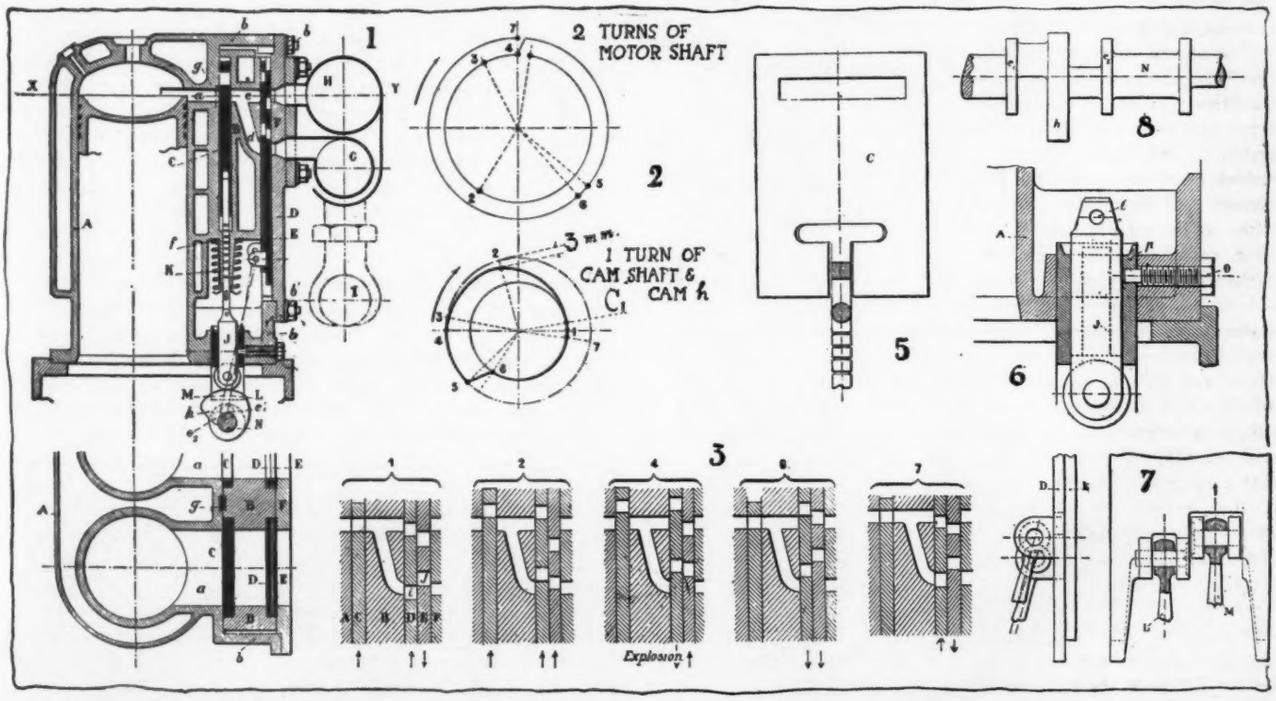


Fig. 1—Section of Neute motor; lower portion is section on line XY of upper portion. Fig. 2—Graphic schedule of cycle, divided into 6 periods. Fig. 3—Successive positions of stopper and valve plates. Fig. 5—Stopper-plate with upper part of control rod. Fig. 6—Lower part of same control rod. Fig. 7—Mounting of control rod knuckles on slide-valve plates. Fig. 8—Camshaft with cam h for stopper-plate control and eccentrics for slide-valve control

a lever for moving this plate up and down being apparently extended through the coverplate and connected with a pedal under the driver's foot.—From *La Vie Automobile,* May 3. [Illustration of brake action is accidentally omitted in original.—Ed.]

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THE Wittig Rotary Steam Engine.—In a recent issue reference was made to the Wittig steam turbine or rotary machine as one whose simplicity might suggest possible applications for transportation work, especially if the thermic efficiency of the steam generation is brought down to a new basis on the system of the Bonecourt flameless surface-combustion or one equally advanced. A subscriber requests more information about the Wittig construction, and it should be said first that the Wittig motor is not a turbine except in the sense of being rotary. On the other hand it is not only a steam engine but works equally well as a water pump, an air compressor, a blower or a gas compressor or as a hydraulic motor. It can also function as a compressed-air engine. The only difference between its mode of operation as a motor and as a transmitter of power lies in the direction of its rotation and the direction of the fluid, steam or gas circulating in it. Fig. 11 shows it as a motor. This illustration and the following reference to its peculiarities are taken from *Le Génie Civil* of August 17, 1912.

The practical utility of rotary machines, other than turbines proper, is usually impaired by a certain defect. It is almost impossible to secure tightness between the vanes and the fixed cylinder without reducing the play between these organs to such a point that the frictions become excessive. This inconvenience seems to have been overcome in the rotary machine which has now been turned out for several years at the Karl Wittig works at Zell, near Wiesental, Baden. This machine is composed essentially of a fixed cylinder *b,* in the interior of which there turns an eccentrically mounted cylinder *a* formed with a series of deep radial slots in which are lodged the vanes *c* which function as pistons. As the number of chambers formed between the two cylinders by means of the vanes is considerable, the variation in the pressures existing in two adjacent chambers is reduced. The vanes assume their varying positions in the slots solely by the action of centrifugal force. As, however, this force, which grows with the speed of rotation, might press the vanes too energetically against the walls of cylinder *b,* such an effect has been obviated very largely by surrounding all the vanes by a metal ring *d* which is rotated with a certain amount of play in a recess turned in the wall of cylinder *b.* In this manner excessive wear of the vanes is avoided, at the same time as continuous contact with the interior of cylinder *b* is assured, owing to the eccentricity of the vanes and the ring as a whole.

A tight joint along the line of contact between cylinders *a* and *b* is also assured without it being necessary to reduce the play between them.

The admission and discharge of the steam, gas or fluid used in the machine are effected without intervention of movable organs, simply by means of circumferential slits giving access to a larger or smaller number of the compartments between the vanes. If the medium used is incompressible, these two slits, one for admission and the other for discharge, extend over the larger portion of the circumference of the exterior fixed cylinder, but the length of the slits is reduced if the medium is compressible and it is made smaller in proportion as the tension of the medium must be more fully utilized.

When this machine functions as a steam motor, its efficiency is said to be comparable to that of reciprocating engines of similar power.

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COTTIN-DESGOUTTES Wheel Drive.—Unless great facility for removing and perhaps replacing a wheel shaft is considered a matter of great importance, the Cottin-Desgouttes system for combining the advantages of the floating shaft with those of the older types, in which the centering of the shaft in the wheel cannot be questioned, may present points of interest though mainly where ball-bearings for the wheels are still preferred to roller bearings. The characteristic feature, as shown in Fig. 9, is the enlargement of the axle-end constituted by a steel box bolted to the flared end of the axle proper, this box containing a double ball-bearing which is almost in alignment with the wheel tread and also prevents the wheel from coming off, and serving as base for the brake action in a very substantial manner, while keeping surplus lubricating oil from flowing to the brakes by providing a trough for it in the lower portion of the box.—From *La Vie Automobile,* May 3.

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BALLET'S Shock Absorber.—The idea of making the shock absorber help in supporting an increased load is finding expression in the type designed by Ballet which is shown in part in Fig. 10. Two coil springs D placed in pistons C with rollers *c* are compressed with a minimum of friction when the cam A is turned by a crank and rod which are automatically operated in the customary manner when the vehicle axle is raised or lowered in relation to the vehicle frame. The shape of the cam seems to indicate that the desired effect is a progressive spring resistance and assistance in carrying an overload rather than the retarding of the recoil after a severe shock. The recoil or spring-extension is in fact accelerated at first. But the moment the recoil would carry the vehicle spring beyond its best position, the cam provides an energetic resistance. The overload capacity is necessarily small so as not to interfere too much with the mobility of the spring under normal conditions.—Illustration from *Omnia,* May 3.

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Troubles with Omnibuses—Complaint has been made to the municipal council of Paris that the seating offered each passenger in the motor omnibuses of that city is far too scant and that the shakings which are received when the rubber tires are worn down to one-half of their original thickness are positively dangerous; finally that the wheels are too small and thereby aggravate all shocks.—From *Le Poids Lourd,* March 21.

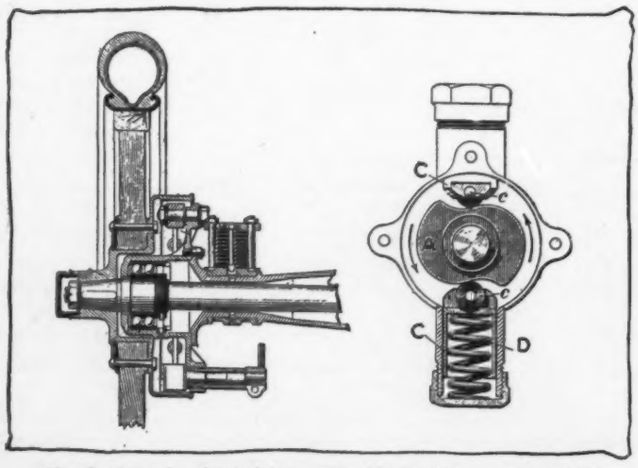


Fig. 9—French wheel drive. Fig. 10—Ballet's spring device

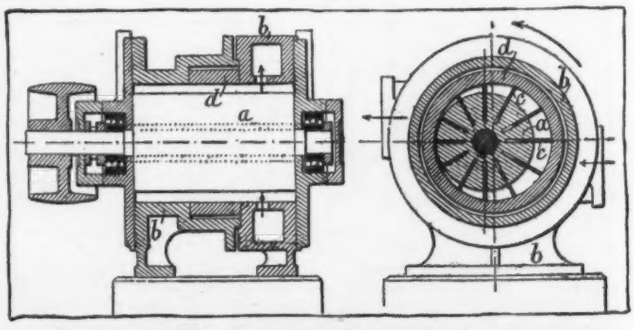
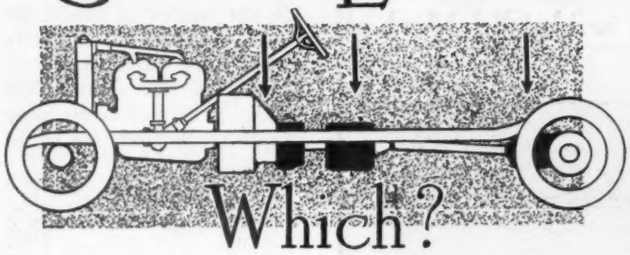


Fig. 11—Wittig rotary steam engine and universal motor

The Engineers' Forum

Gearbox Location



Which?

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Part IV

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Skidding Danger Is Minimized by Proper Location of the Gearbox

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COMMUNICATIONS are still coming in from engineers and automobilists interested in questions of design regarding the best location of the gearbox. The preceding articles showed the remarkable diversity of opinion in engineering circles on this important particular of automobile construction. Herewith are given some arguments in favor of placing the gearbox on the rear axle:

Rear Axle Type Simplifies Chassis—Robertson

BUFFALO, N. Y.—Editor THE AUTOMOBILE:—In view of the present very marked tendency on the part of automobile engineers in general to simplify the chassis as much as good mechanics will permit, it is not surprising that there should be such a strongly-shown inclination to place the gearbox in combination with one of the two units that it connects. By so doing, one eliminates one piece of shafting, two universal joints, and, in some constructions, two oil retainers and one or more expensive bearings. The parts eliminated are particularly objectionable, as in the usual arrangement their exposure to dust and dirt and their commonly inadequate lubrication makes them particularly prone to wear and become noisy and their up-keep as a consequence somewhat of an item.

Either of the two unit constructions has the advantage of greater cleanliness, owing to the fact that there are two less points at which oil can escape.

As to the effect on the car's operation, of the location, of the weight of the gearbox, one has but to consider how much effort would result from a person of less than ordinary weight moving forward or backward a few feet in the car while it was in motion. Compared with the importance of the change in weight distribution in putting on a heavy limousine body the importance of the location, of the weight of the gearbox would almost seem negligible. The location of an electric lighting and starting battery would be of more importance. The rear axle gearbox unit has in its favor the greater silence resulting from the failure of the gear noises to reach the larger masses of the chassis and body which act as sounding boards for all the sounds that reach them. The rather elaborate gear control linkage is against the rear axle unit, however, and in many instances the oscillation of the car springs is communicated to the sliding gears resulting in indefinite gear location. The fatal defect of the rear axle gearbox unit, however, lies in the tremendously reduced ability of the car to perform on rough or uneven road surfaces. Some years ago the writer tried to drive a certain very high class car whose superb motor is the envy and despair of its competitors, but whose gearbox is located on the rear axle, over a very steep and roughly-paved hill on high gear. Not only was the feat wellnigh impossible, but so great was the abuse which the car sustained due to the excessive bouncing and pounding of the rear axle system, that the feat was not again attempted until it occurred to the writer to let considerable air out of the rear tires. Not only was the feat accomplished easily after that, but with the added handicap of starting at the bottom of the hill on high gear. At other times the writer has noticed how much at a disadvantage the cars, whose gearboxes were in the rear, were on the road. Once, on a short 2 days' trip through the mountains of Pennsylvania in company with a chain-driven car of German make, the writer, who was driving a car with a particularly heavy rear axle gearbox unit, had a splendid opportunity for studying under extreme conditions the comparative effect of the lightest and the heaviest types of axles. Suffice it to say that the chain-driven car was at all times master of the situation even on roads so rough as to compel the other to resort to gear work continually. Summing up, it would seem that advantage would all be with the motor gearbox unit up to such powers as would make the use of shaft as final drive of doubtful advisability.—PHILIP ROBERTSON, Y. M. C. A.

Put the Weight on the Driving Wheels—Duryea

SAGINAW, MICH.—Editor THE AUTOMOBILE:—I have read with interest a number of expressions on gearbox location, and I see that one writer favors distributing the weight because this lessens skidding. It has been nearly a score of years since visions of expensive, broken plate-glass flashed in front of me when my motor vehicle suddenly skidded and I have given continual attention to the matter since. I am certain that my product for the last dozen years demonstrates daily that the best prevention of skidding consists in placing the greatest part of the weight on the driving wheels, and that on this account the vehicle will be less likely to skid if the gearbox is placed on the rear axle; and further, that the rear tires will last longer. I have made motor vehicles with almost every possible proportion of weight on the front and rear axles. From the delivery rig, having the motor, tank and driver on the front wheels, with practically nothing at the back when not loaded, to a convertible four-passenger car carrying the rear passengers well behind the axle, and carrying the motor slightly in front with water tank directly over the rear axle. This proportion of rear weight was so great that on a steep hill there was some question as to whether or not the front wheels would remain on the ground. This experience repeated many times, has demonstrated that the best results are obtained with probably three-quarters of the weight on the driving wheels, and that when thus loaded they seldom skid. So certain has this freedom from skidding been that I have never owned or carried regularly a pair of tire chains, and have seldom found a road condition that my vehicle would not negotiate successfully without chains.

You can easily test this for yourself by attempting to push something on a slippery floor. Your feet not being heavily loaded slip badly, but take the load on your shoulders and you walk with certainty over the same slippery surface. The vehicle with the heavily loaded rear does not skid. Its tires are not ground away by its skidding wheels. Its front end is much easier to propel because it is not forced deeply into soft roads. The rear location for as much weight as possible is undoubtedly the best one.—CHAS. E. DURYEA, president, Duryea Motor Co.

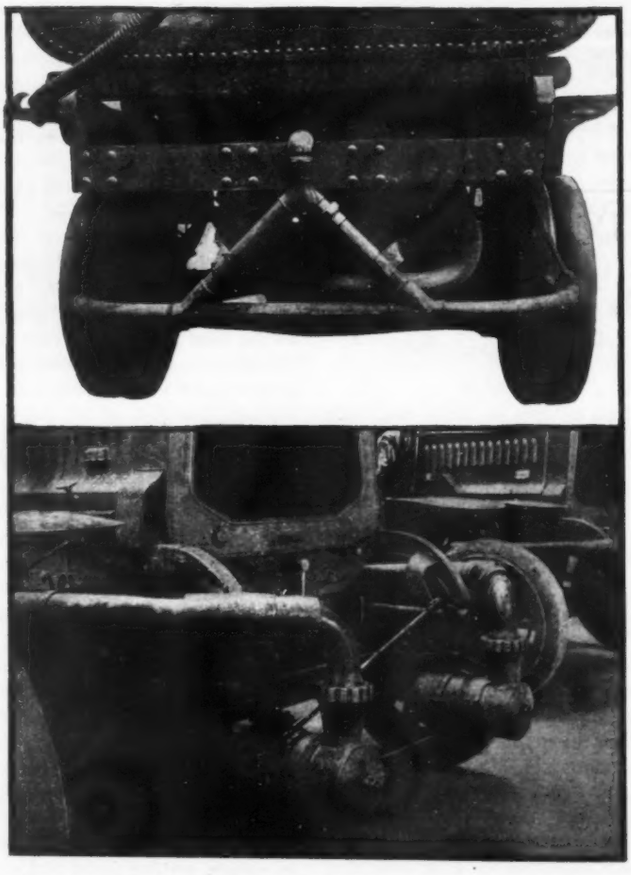
Motor Sweepers Save 12 to 60 Per Cent.

Use of Modern Street Cleaning Devices in Paris and Versailles Reveals Marked Economy as Compared with Old Methods

PARIS, France—It is part of the world's economy that the horse should disappear from the work of cleaning, sweeping and watering the streets and avenues of great cities. This is quite natural, for the horse itself is responsible for at least three-quarters of the dirt to be found on paved streets. Paris has proved it with the Champs Elysees, the automobile section of which never has to be washed and rarely has to be swept, while the adjoining alleys have to receive a daily toilette. Paris is the first city to make use of motor vehicles for street cleaning to the entire abandonment of the horse. The change is not yet complete, but in five of the twenty wards into which the city is divided the horse has gone entirely from the street cleaning department. The other districts have either made a partial change or have decided to convert as soon as present contracts have expired.

The determination of the correct type of machine for street cleaning necessitated a considerable amount of experiment. It was not merely a question of connecting up a motor to a four-wheel chassis driving a rotary brush. This was attempted at first, the city purchasing light, low-power rotary sweepers to replace the one-horse rigs in use for so long; and big motor-driven water-wagons for street sprinkling. It was found that the former raised as much dust as they swept, and that the latter could only be used to advantage in specially wide avenues a few days a year. This experimental work resulted in the adoption of a combination type of sweeper and sprinkler, capable of service throughout the year, wet or fine, rain or snow. The eighth ward, which is the most fashionable district of Paris, comprising the Champs Elysees and the Place de l'Etoile, was the first to make a complete conversion. The work in this ward is accomplished by seven De Dion Bouton machines, replacing from fifteen to twenty-five horses. Under the old system the number of horses was a very variable quantity, owing to the inelasticity of this method. During spring and fall fifteen horses could do the work; in summer and winter twenty-five horses were not always sufficient.

Taking the eighth district as typical of the entire city, the day's work comprises 10 hours, the machines going out at 4 a. m., stopping for 2 hours in the middle of the day, and entering the depot at 4 p. m. The same man is kept in charge of each machine and only skilled drivers are employed, the men having had experience with gasoline trucks being preferred. Drivers of the old horse rigs are not trained to handle the motor sweepers. The nature of the work varies largely according to the weather, the task given to each driver being chosen at the discretion of the overseer.



Upper—Rear view of motor street sweeper. Flow to transverse sprinkler is direct from tank by gravity. Lower—Detail of forward sprinkler on Paris street sweeper

Street washing is generally undertaken during the early morning. The tank is filled from the street mains and the 570 gallons of water pumped out; with the pump working at full force the tank is emptied in about 10 minutes, during which time the machine is run at a speed of 7.5 miles an hour. After swilling with water it is customary to leave the street about an hour to allow the mud to soften before attempting to sweep. Another method is to flood the streets direct from the mains, then send the machines over later for sweeping only. This thorough washing only takes place from once to three times a week, according to weather conditions. It gives an absolutely clean surface with a single passage of the brush. Watering with the front sprinklers at full capacity, the tank is emptied in about 15 minutes, the machine during this time running at a speed of 7.5 miles an hour. This means that the machines will water over a width of 50 feet for a length of nearly 2 miles on one tank load of water.

The majority of the work, however, consists of street sweeping. This is done on a width of 67 inches, at a speed varying from 5 to 8 miles an hour, according to the condition of the road surface. Experience has shown that with a brush traveling at this speed a large amount of dust is raised in dry weather. To prevent this, each machine is fitted with a central sprinkler just ahead of the brush, thus slightly damping the street surface and effectively preventing the raising of dust. With only the pulverizer working, one filling of the tank is sufficient for 4 or 5 hours. During the 10 hours on the street, each machine covers a distance of 38 to 45 miles. This average is based on the work of the seven machines employed in the eighth ward.

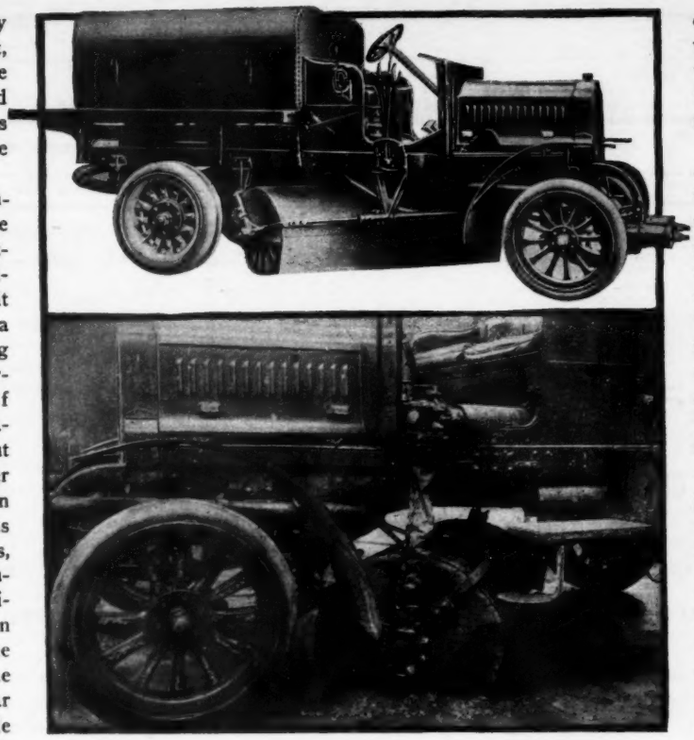
One of the most important advantages of the motor sweeper over the horse variety is that owing to its increased speed it does not interrupt the normal flow of traffic. With an average of 3.8 to 4.5 miles an hour for a full day, including stoppages for filling tanks, etc., it is evident that the normal running speed must approximate 7 miles an hour. The maximum width of roadway watered at one operation is 50 feet. As

the ordinary Paris streets vary in width from 23 to 40 feet, they can all be covered at one operation. The boulevards and specially wide avenues, such as the Champs Elysees, require several operations.

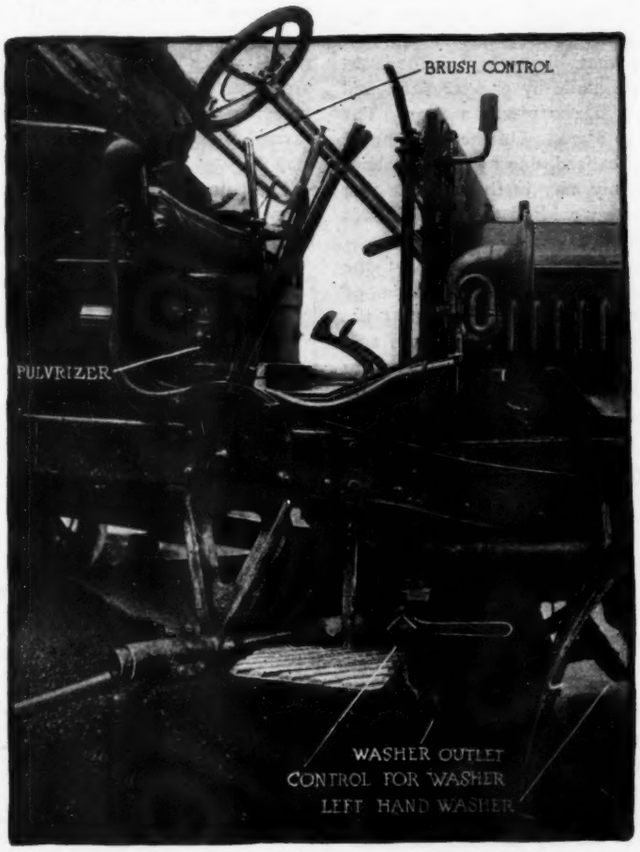
For reasons of economy benzol is used exclusively in place of gasoline. Except in the matter of price, it has no advantages over gasoline; indeed, it is found to foul the motor a little and to necessitate pulling down at more frequent intervals. The average amount of fuel used is 46 gallons per machine per day; this works out at an average of 10.7 miles per gallon. These figures are taken on actual working conditions extending over several weeks, and not on a short experimental run under favorable conditions. Each brush lasts on an average 3 days, or a distance of 120 to 130 miles. At the end of this time it is so far worn down as to be of little use, and is then sent to the city brush factory for the bristles to be replaced.

According to the Paris municipal authorities, the economy by the use of motor street sweepers is from 12 to 14 per cent. over the same work done with horses. The authorities of the city of Versailles declare that an economy of 50 to 60 per cent. is obtained. Versailles has the advantage over Paris, however, of possessing exceptionally wide, straight avenues with very little traffic, thus allowing the machines to work constantly at their maximum efficiency. Paris is one of the most crowded cities in Europe, and except in the early morning the sweepers cannot work to their full capacity.

The De Dion Bouton sweeper and waterer is a machine with motor under a bonnet, the driver behind, and water tank on the rear platform. The brush is placed diagonally across the machine, between the two axles. The motor is an ordinary type of four-cylinder cast in pairs, the bore and stroke being 3.5 and 4.7 inches, and the nominal horsepower 18. Control is reduced to the operation of a throttle. So far as the drive is concerned, the machines follow the general De Dion Bouton design. There is a plate clutch, three-speed gearbox and transverse cardan shafts to the rear wheels. These latter are fitted with twin rubber tires, the front wheels having single rubber tires.



Upper—One of the rotary street sweepers in use in Paris. This is of the De Dion Bouton type. Lower—Partial side view of one of the motor-driven street sweepers, showing the driving mechanism of the rotary brush



Control features of one of the motor-driven street sweepers now in use on the streets of Paris and Versailles. The driver can operate all the important control levers from his seat and the minor adjustments sometimes necessary are all readily accessible

There are four main water outlets to be used according to the different classes of work to be undertaken. At the rear is a transverse sprayer through which the water flows by gravity on the opening of a cock. This is only made use of in narrow streets having insufficient width for the front sprayers to work to advantage. From the pump, at the extreme rear of the chassis, there is a left and right hand main feed pipe passing under the chassis and going to the circular section sprayers projecting beyond the front of the frame. On each feed pipe is a by-pass for the washers, these being branches from the main pipes with their extremity near the ground, just ahead of the brush, and fitted with a valve which can only be opened by the driver getting down from his seat. Also on one of the main feed pipes is a by-pass to the pulverizer, this being a fine spray nozzle near the ground.

The whole of the mechanism is carried on a sub-frame the full length of the main frame, and it is at the end of this sub-frame that the centrifugal water pump is mounted. The pump is driven by a propeller shaft having a sliding pinion on its forward end brought into engagement, by the use of a lever, with one of the gear-set pinions. The operation is practically the same as changing gears. With the pump working, the operator withdraws either one or both of the piston valves at the inlet end of the two main delivery pipes. This delivers water to either left or right-hand pipes, or both. If street watering has to be done, the piston valves in the front sprinklers are withdrawn, either together or separately, admitting the flow to the sprayers. These sprayers are cylindrical housings having a series of fine holes on one-half of their circumference. On the outside of the cylindrical casing is a semi-circular guard which can be rapidly made to completely or partially cover the outlet holes. The two guards have separate

(Continued on page 1078)

NAME OF APPLIANCE..... DATE ISSUED..... J.O. NO.....

DATE COMPLETED..... NO. MADE.....

	NO. TO MAKE	NAME OF PART	MATERIAL REQUIRED	AMT. IN STOCK	BALANCE ON ORDER NO.	BAL. REC'D	MATERIAL ISSUED	UNIT PRICE	TOTAL COST

Fig. 1—Job order, the master form of the system. Every department has a copy

Klaxon Factory System Seen in Detail

Material and Labor Expense Recorded on Nine Forms—Standardization of Nomenclature and Labor Expenditure

AFTER having explained and described repeatedly in the past various systems used for recording materials and labor expended in the automobile service plants of diverse large firms, THE AUTOMOBILE proposes to describe below a simple yet efficient recording system of an up-to-date accessory manufacturing plant. Assuming that a plant of this nature has a yearly output retailing at a total of $1,000,000, it is obvious that every operation must be under the positive control of the management so as to make maximum economy possible. To illustrate this, suppose that by proper methods 25 cents may be saved on each article made by the company and that the output of the company is 20,000 pieces a year. The saving in this case would amount to $5,000. On the other hand, if the saving is possible, but is not realized, due to circumstances unavoidable or avoidable, the company may justly calculate that it loses $5,000 yearly which otherwise would go to pay dividends on its capital stock.

The system which will be taken up below is that of the Lovell-McConnell Mfg. Co., Newark, N. J., manufacturer of Klaxon, Klaxonet and Klaxet horns. Roughly speaking, the system and its various record forms may be divided into two parts, the recording of material and that of labor. There are five blanks for the handlng of materials and for the recording of the cost of labor. It may be said in this connection that only productive material and labor are recorded by this system.

Use of the Job Order Blank

Suppose that a lot of 6,000 Klaxon horns is to be made within a specified time. The principal order for this purpose is issued from the main office over which the manager presides. For this principal order or job order, as it is called, the form, Fig. 1, is used. This is a wide sheet, 11.25 by 9 inches, printed black on white paper and punched along the left edge so as to fit into a binder. The office, when filling out this order, prepares one original and such carbon copies as are needed, one going to each factory department affected. The office fills out the form as follows: On the first line, marked Name of Appliance, is written: 6,000 Klaxons. The date on which the order was given, the order number, the names of the various parts and the quantity required of each, are also filled in. The Date Completed space allows for recording the date of the day on which the order is returned to the office complete. The office also names the materials for motor casings, armature laminations and windings, etc. This having been done, the job order and all its copies are sent to the stockroom. The Date Completed space allows for recording the date the order is returned to the office complete.

The stockroom foreman goes over the list, and in the space marked Amount in Stock he states the quantity of each kind of material stored at the plant. This information is entered on the original and on the copies of the job order; at the same time the materials which are in stock and usable for the job are tagged with a job number and put on a special rack, styled the reserve rack. Then all the sheets are sent back to the manager's office, and purchase orders are made out for the materials which are not in stock. At this time the carbon copies are distributed to the various departments, informing their foremen in advance of the work which they will have to have carried out during the next few weeks or months, as the case may be.

The purchase order which is sent out from the purchasing department to the dealer furnishing the company with a certain class of material or parts, is shown in Fig. 4. The blank

REQUISITION

No..... Date..... 19.....

Department.....

When Wanted.....

Signed..... Foreman

Ordered of.....

Approved

Fig. 2—Requisition form to purchase department

L. M. M'F'G CO.
Form No.
1M. 11-09

FOUNDRY ORDER.

FOUNDRY NO.

COPPER TIN LEAD ZINC FOR J. O. NO.

NO. REQD.	PATT. NO.	NO. MADE	WEIGHT

LOVELL-McCONNELL MFG. COMPANY
Makers of the "KLAXON" Newark, N. J.
190-218 WRIGHT STREET

TO

SHIP VIA

ORDER No.
J. O. No.
Dated

Acknowl.
Prom.
No. 1
No. 2

LOVELL-McCONNELL MFG. COMPANY

By Treas.

Fig. 3—Foundry order used between office and foundry for metal casting jobs Fig. 4—Copy of the company's purchasing order

is 7.75 by 6 inches, and there are three copies of this blank filled out, each being printed on paper of a different color. One copy goes to the dealer, the other to the stockroom and the last to the office. In making out this order the purchasing department enters on it the name of the dealer who is to furnish the material, his address and how the goods are to be shipped. All the orders issued by the purchase department are numbered consecutively, the copies bearing, of course, the same number as their original. The number of the job for which the material is required and the date of desired delivery are also stated on this form. In a space between the two double rules the material is specified, and the treasurer of the company signs the order. When the latter has been acknowledged by the addressee, this is marked on the office copy and the same applies to a possible promise of delivery on the part of the dealer as well as the first and second follow-up letter.

ORDER ON STOCK CLERK

Date ..... **Job Order No.** .....

MATERIAL

.....**Foreman**

Material Issued by .....**Date** .....

Received the above .....

Fig. 5—Material order from department to stockroom

When the material is delivered to the company it is checked by the stock clerk against the order and the invoice, and is tagged with the number of the job for which it is reserved; the invoice is sent to the office. Now, as the various departments require the materials they need to carry out their shares of the job, they call on the stockroom to issue the materials to them. For this purpose the foreman of each department fills out the order to the stock clerk, Fig. 5. This form is 8.5 by 5.5 inches and comes in pads being printed black on colored paper, a copy of different color paper being used for each department. The foreman of the department keeps a carbon copy of the blank as his own record. When the material has been delivered to the department employee by the stock clerk, the former signs the order as a receipt.

The requisition, Fig. 2, is used by the various department heads for miscellaneous materials required, such as specified drills, tools, etc. The blank used for this purpose and here shown is 7.75 by 4.5 inches. Upon the receipt of the requisition, the purchasing department either makes out a purchasing order for the material, or if it has been ordered already, sends out a follow-up letter.

In case the stockroom receives more material than was ordered this material is kept by the company and stored in the stockroom on the so-called free rack, which is opened for the use of any department. The clerk, however, who is in charge of the stock, uses wherever possible the material on the free rack for the job orders, as they come up, so that the free stock is kept down to as small as possible a quantity of materials.

Foundry Jobs on Special Order

When foundry work is required, the manager's office fills out the foundry order, Fig. 3, which is designed along similar lines as the form, Fig. 1. The sheet is 11.25 by 9 inches. The metal to be used is checked and the pattern number, number of pieces required, job number and foundry order number are entered on this sheet. The foundry foreman after having done his work records on the order the number of pieces made and their total weight after which the form is sent to the office and the material to the stockroom.

Coming to the labor recording system, the clock card and the daily time slip are the fundamental forms used. The former is a weekly record, and is illustrated in Fig. 9. The blank is 3.5 by 5.5 inches and besides spaces for the number and name of

DAILY TIME SLIP

No. NAME DATE FOREMAN'S O. K.

Job Order	Name of Operation	Started	Stopped	P. M. or A. M.	Pieces	Hrs.	Rate	Cost

IMPORTANT—MARK ITEM "FINISHED" WHEN JOB IS COMPLETED.

Fig. 6—Workers' daily time slip

LOVELL-McCONNELL MFG. COMPANY

RECEIPT FOR WAGES

No. NAME

YOUR PAY FOR WEEK ENDING 191

IS $

SIGN AND PRESENT THIS RECEIPT TO PAYMASTER AT TIME OF PAYMENT

NAME

Fig. 7—Wage receipt form blank

¶ *The daily time slip, used to account for the portions of the total working time of each man, as given by his clock card, is designed to give every point of information relating to this phase of factory work, making an exact account thereof possible.*

¶ *By the use of the two forms shown above, the question of an exact payroll is being solved to mutual satisfaction of both the company and the force. These two forms, together with the weekly clock card, constitute an efficient time-checking system.*

¶ *The receipt for wages paid out to the worker is a fit example of how small trouble, which often is the cause of large nuisances, can be avoided. No worker having signed a slip such as this will come back and claim that he did not receive his pay.*

the employee is marked for an entry of his total wages earned during the week and the deductions made for the sick benefit and the Klaxon Savings and Aid Association, a body organized for mutual assistance among the men. The clock card provides spaces for stamping three starting and stopping times a day on it.

As to the distribution of a man's working time, this information is obtained by means of the daily time slip, Fig. 6. This form comes in pads of 7.38 by 3.75 inches, being printed black on colored paper, a different color being used for each department for simplicity. Exact information including whether a man works on a time or piece basis is thus obtained and the slips of all the men are turned into the office at evening.

In this connection it should be mentioned that the company is making earnest and well-directed efforts toward a standardization of nomenclature of the various working operations carried on in the shop. The management recognizes that as long as different men style one operation as boring, drilling and whatever other names are used in the different shops, there is no way of getting away from misunderstandings in the company's office where the cost sheets are figured and made up.

Making Up The Daily Cost

In the office the information is transferred from the daily time slips to the daily cost sheet, Fig. 8, which is kept in a binder. This sheet is 8.75 by 11.5 inches, printed black with red and blue rules on white ledger paper. Of course as many cost sheets as necessary are used every day. Under Name, the exact part name is entered, and the job number is also written on the form. The lower portion of the latter is divided into eleven columns, each of which has three small divisions marked Date, Pieces and Cost. In filling out the daily cost sheet, the office clerk doing this work writes into the square space on top of a column the standardized name of the operation, for instance:

Casing, Drill and Tap.

Under this heading all the time spent by any worker of the factory in carrying out this operation on a job order during the day before is recorded, together with the number of pieces produced in that time and with the wage paid for that work. In this manner the full amount of any kind of part made in the shop is ascertained and this number must be identical with that of the pieces paid for on the previous operation. Any discrepancy arising causes an immediate examination of the situation to clear the problem. Likewise, this cost sheet makes possible the establishment of standards of cost for the production of any part or parts of the devices made by the company.

The day before pay-day each man receives a wage-receipt blank,

DAILY COST SHEET J. O. No.

Name Sheets Sheet No.

Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost	Date	Pcs	Cost

Fig. 8—Daily cost sheet giving the working operations of all men and their cost

Fig. 7, a yellow slip with black print, 4.5 by 2.5 inches. Before receiving his money, he signs the slip and exchanges it for his pay envelope.

In order to keep up a general discipline in the factory, the company has prepared a leaflet giving rules and regulations for its workers, Fig. 10. The same is 9.75 by 6 inches and gives complete instructions with regard to the work, payments and various points of order which must be rigidly adhered to. Each man receives a copy of this leaflet when starting in his position, and if he needs another copy, he may, of course, obtain the same from the office of the company.

Forms Adapted To Their Purpose

Close inspection of the various forms brings out their adaptability. For instance, the job order blank is so designed that the manager in his office, getting reports from the stockroom and the various factory departments, is able to have this information put on the job order original; the result is that this information is always at hand and it is not necessary to send for various department heads or clerks in order to find out things which, by proper communication, could have been forwarded to the manager's office days or weeks earlier. Likewise, it is possible at any moment to figure up the full cost of the whole job or part of it.

The daily cost sheet likewise opens up new perspectives. First of all it makes possible the standardization of cost of even the smallest of shop operations. Here is a practical and useful example of shop records. Cost standards having been arrived at, the time needed for the making of one unit part at average cost may be analyzed according to the rules of motion study and waste motions on the part of the workers may be eliminated. It goes without saying that once the nomenclature has been standardized this will also influence the design of the daily cost sheet. It will, of course, prove a saving of time if the various working operations are printed on cost sheets instead of being written.

Finally, the idea of the reserved stock rack and the free rack will commend itself to more than one factory manager.

LOVELL-McCONNELL MFG. CO.

Form No. 5023

TIME CARD.

No._____ NAME_____

TOTAL WAGES_____

S. B._____ No._____ K. S. A._____

NET AMOUNT_____

DAY	Started	Stopped	Re-Started	Stopped	Re-Started	Stopped	Total

FOR WEEK ENDING_____

NOTE—Pay is made up only for time shown hereon.

Fig. 9—Workers' weekly clock card

¶ *This clock card for shop workers as used at the Klaxon plant contains a number of details comparing favorably with cards used in various other works and well worth consideration.*

THE following rules and regulations will govern employment in this factory.

TIME CARDS

Each individual is to ring his own time card when starting or stopping work. The payroll will be made up on the basis of the time as shown on the time cards. Deductions will be made on the basis of quarter hours. One minute's tardiness is sufficient to cause the loss of one quarter hour's time.

WORKING TIME

Hours of employment are from 7.00 A. M. to 12.00 M., and 12.30 P. M. to 5.30 P. M. on week days, except Saturdays. On Saturdays from 7.00 A. M. to 1.00 P. M. On Saturdays the power will shut down at 12.45 P. M. to give machine operators an opportunity to clean their machines. Employees who do not run machines are to continue working till 1.00 P. M.

DAILY TIME SLIPS

Daily time slips are to be made out the first thing each morning for the previous day's work. They must be on the foreman's desk not later than eight o'clock.

PAY DAY

Pay day is Wednesday, and payment will be made for the week ending on the previous Saturday. If Wednesday is a holiday, payment will be made on the previous day.

OVERTIME

For overtime till midnight payment will be made at the rate of time and a quarter. After midnight and for Sunday and holiday work at the rate of time and a half.

SMOKING

Smoking is positively prohibited in the factory at all times. It is permitted during noon hour in the foundry, boiler house or yard.

WASH-ROOM PRIVILEGES

Employees must keep all clothing in the wash-room. The wash-room will be kept locked and entrance to the same during working hours can only be gained by presenting a permit duly signed by your foreman.

OILY WASTE

Oily waste must not be left laying around, but is to be put in the receptacles provided for it.

GENERAL CLEANLINESS

This company makes a special effort to provide its employees with comfortable surroundings and the coöperation of our employees is requested, in order that the best results may be obtained.

You are particularly requested to throw refuse of all kinds into the dirt barrels and not on the floors or grounds.

You are also cautioned not to leave towels, hats, shoes, etc., laying around the wash-room. It is understood by the cleaners that material left laying around is worthless and can be removed when found.

TOOLS

Tools will be issued from tool room only on a check. In the event of an employee leaving, all tools must be returned before an employee will be paid off.

Failure to obey any of the above will be considered sufficient cause for summary discharge.

Lovell-McConnell Mfg Company
Newark, N. J.

Fig. 10—Copy of company's rules-and-regulation leaflet distributed to workers

Choosing a Color Scheme

Lighter Shade Should Be Used on the Chassis Than on the Body in a One-Color Scheme

IN choosing a one-color scheme for the car, it is always in order to use a lighter shade for the chassis than is employed upon the body. A better-balanced appearance will invariably result. When, for example, a deep ultramarine blue is selected for the panels of the car, with the upper parts of the body black, the chassis should carry the light shade of ultramarine blue. Stripe the chassis with a 1-4-inch line of black and at each edge of this stripe run a fine line of gold. Stripe the dark blue panels with two 1-8-inch lines of the light shade of ultramarine blue and run a fine line of gold between the two. This yields a charming color effect.

Another method of using blues on the car consists of deep blue for the door and main side panels, and a medium deep shade of the same blue for the chassis and upper panels of the car. Paint the moldings black and stripe the chassis with a broad black line split at the center with a single line of gold.

In greens, Brunswick green, deep, for the main body panels, with black upper panels, and black moldings, with double fine lines of black run around the green panels makes an ideal combination. The chassis should be painted the light shade of Brunswick green with striping lines of black.

Silk Green Is Very Popular

Silk green is probably the most popular green for this season among owners attracted by smart coloring. Use for example, medium silk green for the body panels, dark shade of same color for the narrow upper panels, and light shade for the chassis.

Stripe the body panels with double lines, 1-8-inch wide, of black, with a fine line of gold running between the two. Stripe chassis with fine lines of black 1-2 inch apart and in this center space cast two fine lines of gold 1-16 inch apart. Have the upholstery to match the body panels, and the effect will prove admirable.

Napier and thistle green are soft toned, magnificent greens, and upon the heavier type of car they offer splendid effects. Paint the main body panels in either of these two greens and for unique effects run vertical 1-inch stripes 1-5 inch apart, of darker green, or if so preferred, of lighter green, directly across the panels. Paint the upper panels either black or a very deep shade of the main panel green. Paint all moldings black. Give the chassis a light shade of the same green, and stripe with the deep panel green.

The main scheme of coloring for the automobile at the present time consists of colors in the main dark and fine without any sharply contrasting color such as the reds or maroons or lakes might afford.

Dark warm browns for touring cars and runabouts are much in evidence this season, and they really do produce fetching effects when artistically placed upon the surface. Place the dark shade of tan brown on the upper or narrow body panels, the medium shade of same color on the main body panels, and light shade for the chassis. Thus you have a graduated color scheme which brings the shades into proper relation to each other. Paint all body moldings black and use for the panels and for the chassis .375-inch lines of black, edged with very fine lines of gold. Quite the same scheme may be effectively employed in using Manila or Oriental browns, two exceedingly popular browns.

For a particularly high-colored blue withal strikingly bold and beautiful, adapted for the light runabout and a light class of touring cars, cobalt blue, light, for the main body panels, with moldings black, and cobalt blue, extra light, for the chassis, with gold or aluminum striping, done principally in fine lines, yields something in the way of colors quite out of the ordinary.

A new comer in the field of lake pigments is the lovely Japanese crimson lake over which the ladies in autodom linger in genuine feminine adoration. This is a wonderfully deep, luminous pigment suitable for big touring car decoration. A very effective way of painting the car in this color is to use the deep shade for the main body panels, the light shade for the upper panels and the chassis, and to paint the moldings black, and employ black lines for the striping. Fine lines of gold look attractive upon this color.

The fact that the lake pigments are rapidly increasing in favor for use upon the automobile, and especially for touring cars, serves to interest the car owner in these colors as never before.

To develop striking, yet harmonious combinations with the lakes, paint the main panels of the car English scarlet lake, deep, upper panels English purple lake, chassis English crimson lake. All moldings to be painted black. Again, paint the upper panels black, large panels Munich lake, medium shade, and chassis French carmine, moldings to be painted black, with black lines of striping.

Another way consists of painting the main panels English scarlet lake, upper panels French carmine with chassis same color. Moldings to be painted English purple lake. Striping lines on both body and chassis to be in black and gold lines.

Another very popular combination is made by painting the large body panels English purple lake, upper panels and chassis English crimson lake, moldings black. Lines of striping to be in aluminum.

Returning to the green pigments, one of the superb greens of the season is olive green, a shade instantly attractive. This is a soft, warm, brilliantly toned green. Give upper panels plain black, large panels deep shade of the green, and chassis a light shade of same color. Moldings to be in black, and striping lines to be French carmine.

English rose lake of deepest shade for the upper panels, medium shade for the large central and back panels, and the lightest shade for the chassis, the lines of striping to be in French black; moldings painted in same color.

All these lakes are very largely transparent, and to be effective, they must be used over ground colors brought up with great care and enriched to an extent only surpassed by the actual lake coat itself. Over such grounds it is good practice to apply a single coat of the selected lake mixed to dry and flatten out without any gloss. Then for the final coat thin some of the lake with turpentine in which condition add sufficient rubbing varnish to give the mass a good, substantial gloss. Handled in this manner there is developed a color display which for elegance and luxurious effects cannot be surpassed.

All colors will appear richer and finer if they are used in connection with varnish, as varnish colors, for the final color developing coat. If the surface is brought up clean and smooth, with the feel of velvet, and given one or two coats of the color diluted with turpentine to dry flat without luster, the final color coat will need to carry only sufficient pigment to stain the varnish.

Color Combinations for Big Cars

Dark and medium cobalt blue, dark shade for the body and medium share for the chassis, both being striped with double fine lines of white or gold, also give a rich and durable effect.

In brown, the tan color, dark shade for the body and light shade for the chassis, striped with a .375-inch line of black edged with fine lines of gold form an excellent combination.

In the gray, battleship and monitor gray are perhaps the most widely liked. If brought up carefully to a finish they are among the exceedingly durable colors. They make exceptionally pleasing colors for big cars.

For a seven-passenger touring car, French gray, deep shade for body and medium shade for chassis, striped with a .25-inch line of light French gray and this line edged with fine lines of gold, gives great service and a very attractive appearance.

Among the New Books

Numerous Works Treating of the Automobile and Kindred Subjects of Interest Are Spring Offerings

ALTHOUGH some of the books reviewed herewith would seem at first glance to be foreign in subject matter to the automobile and consequently to many of our readers, a further inspection brings out the fact that all of the works considered are in some way related to either the car itself, its accessories or to some phase of the wonderful industry which has been built up around it.

LIST OF AUTOMOBILES SHOWING MODEL TYPE OF BODY AND LIST PRICE WITH HORSEPOWER AND COLLISION INSURANCE RATINGS, published by the Commercial Union Assurance Co., Ltd., of London. 55 John street, New York. Issued to interested parties by the Commercial Union Assurance Co., Ltd.

This little handbook contains the names, models, horsepower and collision classification of practically every motor-driven vehicle. This book used in connection with the rate sheet will immediately tell anyone the amount of insurance required on any given vehicle.

THE GAS, PETROL AND OIL ENGINE, Vol. II by Dugald Clerk and G, A. Burls, members of council of the Institution of Automobile Engineers, published by John Wiley & Sons, New York City. 838, 5.5 by 8.75-inch pages, with 478 illustrations. Cloth, $7.50.

Three years have been spent in the preparation of this volume, and this length of time has elapsed since the first volume was published. In the present book there are twelve chapters. Chapters 1, 2, 5 and 12 are by Dugald Clerk, chapters 7, 8, 9 and 11 are by G. A. Burls. The remaining chapters were written in collaboration. The work has been arranged in such a manner that it represents the views of both authors in combination, each subject touched upon having been dwelt upon in a joint discussion.

Chapters 1 and 2 treat of the development of two- and four-cycle motors and describe the problems which have come up in design and how they have been solved or unsolved as the case may be. Chapter 3 deals with the development of the ignition system; chapter 4 describes governors; chapter 5 touches upon gaseous fuels; chapter 6 deals with the volatile fuels; chapters 7 and 8 take up the design of former and existing types of gasoline engines; chapter 9 is devoted to carburetion; chapters 10 and 11 discuss oil engines and chapter 12 is devoted to the future of internal combustion motors.

The chapters are all exhaustive on the particular subject to which they are devoted and the entire work is of value as a reference book.

AUTOMOBILTECHNISCHES HANDBUCH, 7th edition, illustrated; by Dr. Ernst Valentin, with assistance of ten other engineers; 952 pages. Published by M. Krayn, Berlin W 57. Price, 4.50 Mark.

This work, in its edition for 1913, enters upon nearly all those questions related to automobile construction and engineering—including motorboats and motorcycles—which are omitted, for being too specific, from the general engineering handbooks. It contains opinions as well as data; in most cases well separated, however. A table of logarithms and a recapitulation of mathematics and physics, sufficient for those who are only rusty but not for learners, add to its practical value. The illustrations are drawn from textbooks and from material furnished by the German industry. Current topics, such as valveless motors, silent chains and gears, worm drive, are included in the treatment. The print and the illustrations are too small for comfort and clearness, and for this the low price can compensate only in part. For engineers and mechanics in this country, the book may in many instances have a special value as a means for keeping abreast of German technical nomenclature, as in most instances it is handier and more definite and conclusive in this respect than a dictionary, though of course not so complete. The chapters on traffic and legislation should be of interest to all touring in Germany.

THE AUTOCAR IMPERIAL YEAR BOOK, 1913, for circulation in the colonies over seas and abroad, published annually by Iliffe & Sons, Ltd., London, Eng., 112, 12 by 8-inch pages, illustrated. Boards, 2 shillings, 6 pence.

This work is a review of the automobile situation of the world in general and England in particular as it stood at the beginning of the year. The trend of modern development is studied by taking up particular parts of the car and pointing out what has been done during the year of 1912. Not only the engine, but the details of coach work are touched upon and the development pointed out. A complete data table covering 20 pages is given in which are included all the important details of the best-known cars in the world which are on the British market. An interesting department of the issue is the history and the records of Brookline track. A study of the lighting systems and starters now on the market is also of special interest. This work can be read to advantage by any member of the trade or anyone else who wishes to keep in touch with the British industry.

THE A. B. C. FISCAL HANDBOOK, published by Free Trade Union, 25 Victoria street, London, S. W. 262 pages 5.5 by 8.5 inches. Paper, 1 shilling.

The Fiscal Handbook, 1913, contains complete statistics of British foreign trade over a period of years. These statistics are based on the declarations of importers and exporters of the goods under their respective classifications as verified by the customs officials at the various British ports. The figures on exports are automatically checked because the exporter must declare specifically whether the goods imported are of foreign or British manufacture and in case of a mis-statement is liable to penalization. As for imports, the value of all goods arriving in England and declared as mentioned are included in the import figures under their various classifications, except personal luggage, ships and military stores, packing cases and a large portion of the jewelry imported. Many interesting facts may be learned from the Handbook. Of particular interest to the automobile world, however, are the figures on automobiles, parts and chassis given on pages 150 and 151.

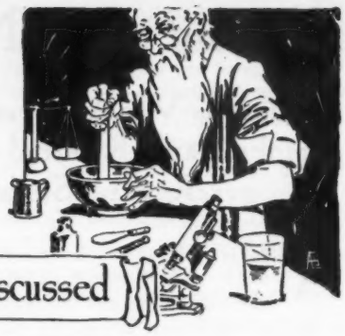
TRADE MARK LAWS OF THE WORLD AND UNFAIR TRADE. By B. Singer, published by the author, 30 Church street, New York, or National Life Bldg., Chicago. 700, 6 by 9-inch pages, bound in buckram, $5.

This work gives a digest of the trade mark laws of every country of the world. The registration of trade marks of popular and standard classes of merchandise has become tremendously important of late years, owing to the keen rivalry among the nations of the world. A registered mark protects the manufacturer as well as the owner against those who seek to imitate the production of a certain article. Trade mark laws of different countries vary to such an extent that it is necessary to anyone engaged in international commerce or who markets an article which he desires to protect against foreign imitators.

AN EXPENSIVE EXPERIMENT. By Reginald Pelham Bolton, author of *Building for Profit, Motive Powers,* etc., published by the Baker & Taylor Co., New York City. 281, 5 by 8-inch pages. Cloth, $1.25.

This is the story of a wasteful method of securing power which was adopted by a Canadian province, in utilizing the Canadian Niagara. "In 1897," states the author, "the city council of Toronto applied to the legislature of Ontario for permission to enter upon municipal ownership and operation for electrical service." The result of this was what the author calls the Great Experiment. How this experiment worked out and its result in the loss to the public is interestingly told by the author in a clear, concise manner.

The Rostrum



In which Letters from Readers are Answered and Discussed

Ignition Used on the 1911 Ohio—Detecting Acetylene Leaks—Securing Proper Valve Timing—New Jersey Law in Effect—Ford Lights Do No Damage—Proper Adjustment of Ford Vibrator—Trouble Caused by Dirt in Gasoline

Splitdorf Ignition on Ohio 1911

EDITOR THE AUTOMOBILE:—Will you kindly explain the Splitdorf ignition system as used on the 1911 Ohio 40?

St. Louis, Mo. E. H. K.

—On the 1911 Ohio cars the model B and model D Splitdorf magnetos were used. These magnetos are absolutely the same except that the model B has three permanent magnets and the model D has two. These are low-tension magnetos. That is to say, the armature of the magneto has but one winding and the current is raised to a high voltage by passing it through a transformer having a low and high-tension winding similar to that of an induction coil for batteries. This brings the current to a point at which the tension is sufficient to cause the spark to jump across the gaps in the plugs against the resistance of the gas compressed in the cylinders.

In addition to using the current from the magneto the transformer also acts as a spark coil by using the breaker mechanism of the magneto as a circuit breaker to interrupt the battery current. The battery current is used for starting purposes or for an emergency. The distributor is used to bring the current thus used to the spark-plugs. This gives a dual system with one set of plugs and both systems are controlled by a switch on the dash.

In Fig. 2 a full wiring diagram is given for the models B and D magnetos. By arranging the wiring in the manner shown in this diagram the system above described is operated.

With a system of this kind you have always a reserve in case the magneto should ever get out of order. The batteries would not be disabled through any disarrangement that could possibly occur under ordinary circumstances.

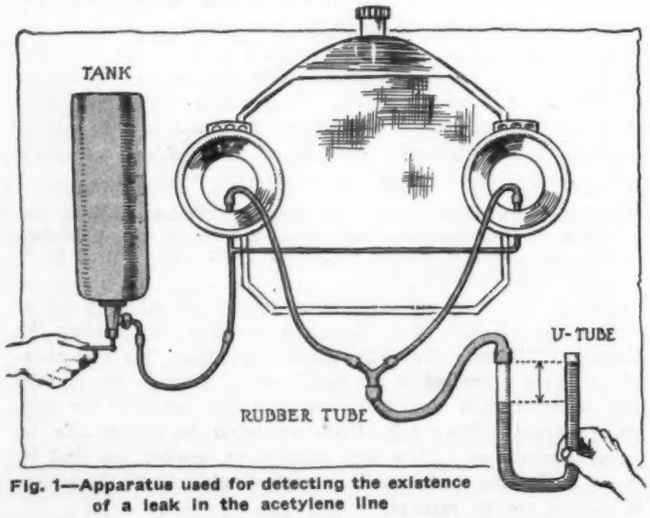


Fig. 1—Apparatus used for detecting the existence of a leak in the acetylene line

Locating Acetylene Gas Leak

Editor THE AUTOMOBILE:—I have been troubled by the gas tank on my car running down without using the lamps. I think there is a leak somewhere in the line but I have been unable to find it. I would like to find out two things, first if there is a leak and second how to locate it. I am not positive about there being a leak as it might be that I have used the lamps more than I think and that I am mistaken in my calculation as to how long I have had them lit, but if there is a leak I want to find it. I know acetylene is traceable by an odor but I have not been able to smell any escaping gas along the pipes. What method do they use in garages for determining whether or not there is a leak?

German Valley, N. J. GAS-LINE.

—You can readily determine whether or not there is a leak by using the simple apparatus shown in Fig. 1. This consists of three pieces of rubber tubing, a three-way pipe connection, and a glass U-tube. The burners of the acetylene lights are removed and the ends of the rubber tube placed over the projecting pipe as shown in the illustration. The valve on the gas tank should be closed while this is done. Some water is now placed in the U-tube but not enough to completely fill it. The needle valve on the gas tank is slowly opened until the water in the U-tube is lifted to the position shown in Fig. 1. The valve is then closed and the U-tube watched. If water drops to the same level in both branches there is a leak. The leak can be found by mixing up a thick soapsud solution and covering sections of the pipes and tubing especially at the joints. The leak will be detected by the bubbles.

Timing Intake and Exhaust Valves

Editor THE AUTOMOBILE:—In timing the exhaust valves and intake valves by means of a rod put in priming cups, where should the exhaust close and intake open; giving it in inches or part of an inch of the stroke? Also the difference in a 4-inch stroke, 4.5-inch stroke and 5-inch stroke; or, are they timed alike? Are the firing points the same on the battery as magneto in setting? What is the correct firing position for the piston on a 4-inch stroke, 5-inch stroke and 5.5-inch stroke?

Newark, N. J. JOHN WILLS.

—It is impossible to do a good job in timing the valves of a car by measuring with a rod in the way you suggest because the measurements are so small at the beginning and end of the stroke as compared to a number of degrees of revolution of the crankshaft. The timing should be done by measuring the degrees on the flywheel. It is easy to divide the circumference of the flywheel into 360 equal parts and to lay out the timing as accurately as desired instead of relying on micrometer measurements in thousandths of an inch when measuring by means of a rod. For instance, 5 degrees past upper dead center on a

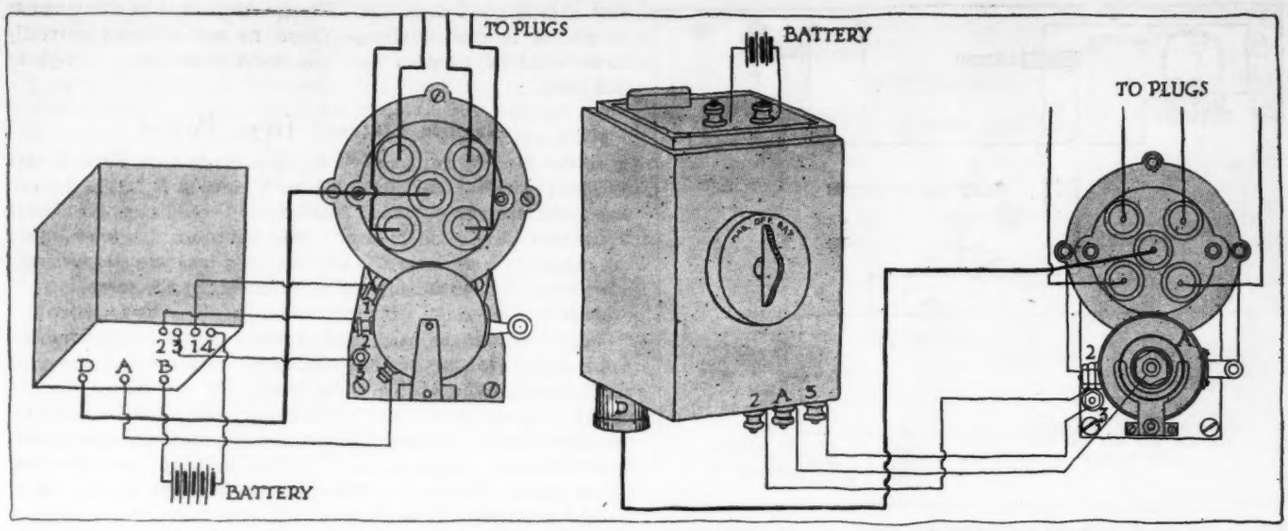


Fig. 2—Method of wiring model B Splitdorf magneto and model D Splitdorf as used on the Ohio 1911

12-inch flywheel would mean that the piston had gone down on its stroke a distance of .0457 inch. This would be rather hard to measure correctly. This same distance measured around the circumference of the flywheel would be .5236 inch. This is more than ten times what you would have to measure on the rod through the cylinder and therefore gives you about ten times the chance of being accurate. It is much easier to measure .52 inch than it is .04 inch in the first place and a difference of .01 inch in the case of the .52 would not be serious while with the .04 inch it would be a 25 per cent. error and would be serious. The idea of measuring timing in the way you suggest should be abandoned.

Open the compression cocks on the motor and turn it over until cylinder No. 1 is on the exhaust stroke. Revolve the motor slowly, then until the piston in this cylinder reaches upper dead center. This you can tell by means of the rod in the compression cup hole. Mark the rod at the point where the piston is at upper dead center or, in other words, when the rod is lifted as high as possible. When you have got this point located exactly and you are sure that you are right, center-punch the flywheel and some mark on a part of the stationary part of the engine near it so that you will know that when these two marks are directly opposite each other the piston in the No. 1 cylinder is on upper dead center. After you are sure the marks are in line correctly and that the piston is really on upper dead center, center punch on the flywheel alongside the mark you have made, 1-U-C. This will signify that cylinder No. 1 is on upper dead center.

You have now made a definite point from which you can start your timing operations. Before you can do anything else you will have to know what part of the circumference corresponds to 1 degree, because in this kind of measuring work dimensions are given in degrees and not inches. A degree is 1-360 of the distance around the flywheel. If you have a 12-inch flywheel each degree is .1047 inch; on a 14-inch wheel each degree is .12508 inch. This is practically 1-8 inch.

The cams being made for your car you will have to arrange the opening and allow the closing of the valves to fall as it will. Turn the motor over slowly until the flywheel has turned 10 degrees. This will be 1.047 or 1 3-64 inches on a 12-inch wheel or 1.2508 or 1 1-4 inches on a 14-inch wheel. At this point the inlet valve on No. 1 cylinder should start to open. At this point put another mark on the flywheel opposite the mark which was opposite the 1-U-C mark that will now be 10 degrees around to the right as you face the motor. This mark shows where the inlet valve on cylinder No. 1 starts to open and should be marked I-O-1.

The next point to locate is the opening of the exhaust valve on the No. 1 cylinder. Turn the crank slowly around to the right on the suction stroke, while the inlet valve will remain open and then around on the compression stroke and down on the firing stroke until you reach a point 40 degrees in advance of lower dead center. At this point the exhaust valve should start to open. If you have an L-head motor the cams will be on one shaft and when you have set the first one you will have no control over the others, but will have to let them fall as they come. With a T-head motor, however, you can set the exhaust valve in the No. 1 cylinder. On a 12-inch wheel 40 degrees will be 4.188 inches, or 4 3-16 inches, and on a 14-inch wheel it will be 5.032, or 5 1-32, inches. This distance is measured around the circumference as described. The point on the flywheel that falls opposite the mark on the fixed part of the motor should be labeled E-C-1.

The inlet valve should close 30 degrees after lower center and the exhaust valve should close 5 degrees after upper dead center. These points should be marked on the flywheel the same as the others and also the timing of the other cylinder. For instance, where the exhaust valve of No. 3 cylinder closes the mark used would be E-C-3.

The timing on the different motors you mention will all be the same when referred to the degree system and you will not have to bother with the differences in stroke as these are automatically taken care of. In each case the maximum firing point advance should be 37.75 degrees before dead center, or 6 7-32 inches on the flywheel.

Jersey Law Requires License

Editor THE AUTOMOBILE:—1—Could a boy of fifteen under any circumstances in New York and New Jersey procure a driver's, owner's or chauffeur's license? I can pass any examination that could be put to me. Another question as to whether a boy can drive if accompanied by his father (the owner)?

2—I would also like to know what compression is generally used on special racing cars; also the piston clearance and the amount of clearance at top and bottom of stroke, *i. e.*, amount of taper in cylinder.

New York, N. Y. FRED H. WELLS.

—1—The law in New Jersey as now in force on this subject is as follows:

The Commissioner of Motor Vehicles shall be authorized, and full power and authority are hereby given to him to license at his discretion and upon payment of the lawful fee, any proper person of the age of 18 years or over to be a motor vehicle driver, said commissioner or his agent having first examined said person and being satisfied of his ability as an operator, which examination shall include a test of the knowledge on

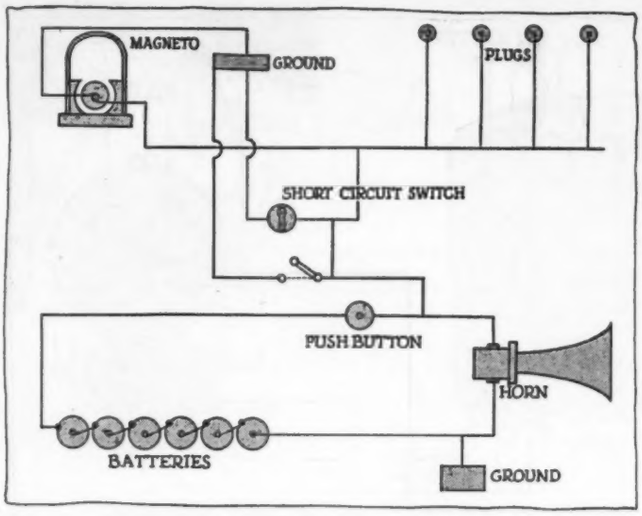


Fig. 3—Incorrect methods suggested by reader for throwing horn and magneto out of circuit

the part of the said person of such portions of the mechanism of motor vehicles as is necessary in order to insure the safe operation of a vehicle of the kind or kinds indicated by the applicant, and the said applicant having demonstrated his ability to operate a vehicle of the class designated; provided, that it shall be lawful for the Commissioner of Motor Vehicles to grant licenses to persons between the ages of 16 and 18 years who, by reason of their exceptional ability, the Commissioner deems proper to be licensed, such persons to be licensed only by the Commissioner after a personal examination held under his immediate supervision; and the said Commissioner of Motor Vehicles may, in his discretion, refuse to grant a license to drive motor vehicles to any person who shall, in the estimation of said Commissioner, be an improper person to be granted such a license; and the said Commissioner shall have power to grant a registration certificate to the owner of any motor vehicle, application for registration having properly been made and the fee therefor paid, and the vehicle being of a type that complies with the requirements of this act. But it shall be lawful for the Commissioner of Motor Vehicles to refuse registration to any vehicle that, in his estimation, is not a proper vehicle to be used upon public roads and highways of this State.

2—The compression pressure on racing cars averages about 80 pounds to the square inch. The piston clearance on these cars varies with the bore of the car but is very close to .010 inch at the top, about .005 inch at the bottom and .008 inch at the rings for a 4.5-inch engine.

Ford Vibrator Not Adjusted Right

Editor THE AUTOMOBILE:—I have a Ford touring car model T 1910. It has not been run over 5000 miles and has just been taken down to see what caused a knock. We found the magneto was touching thirteen of the fields, due to slight endwise motion in the main bearings. I had new bearings put in at the garage, but the motor will not run on the magneto, except for a little while running idle. It then stops and will not start on magneto. The magneto will light a 6-volt lamp. In fact, it will make the carbon glow slightly when spinning by hand. Is there anything the matter with this magneto? Have the repair men assembled the motor with too much clearance between magneto and fields? What is the proper distance of this clearance? Why does the magneto light up a lamp and the motor will not start or run on it? The garage man says magneto is no good; if so, why does it generate from 4 to 6 volts.

Athol, Mass. GEORGE T. BRILLS.

—The fact that the magneto will light a 6-volt lamp shows that it is in good condition. The trouble is not in the magneto at all but in the vibrators. These are not adjusted correctly and should be attended to. The correct clearance is 1-54 or .018 inch.

Lights Detract from Power

Editor THE AUTOMOBILE:—I am the owner of a Ford T 1912 Roadster which I am equipping with electric lights to be run from the magneto. What voltage and candle power lamps would you advise me to use? Will lights of this kind injure the magneto in any way? Does the 1913 magneto produce any more current than the 1912 or is it just about the same?

Modesto, Ill. K. L. NIFONG.

—The lamps to be used in connection with a system for the Ford car should be of the 6-volt type and develop about 10 candlepower. The use of these lamps will not injure the car or the magneto in any way but will have the effect of reducing the power while the lamps are in use, because the spark given by the magneto will be weaker. When the lamps are taken out of the circuit the power will be just as good as before. It is merely a matter of whether or not you desire to sacrifice a small amount of power for the use of the lamps. The 1913 magneto does not produce any more current than did the 1912. They are the same.

Dirty Gas Line Causes Trouble

Editor THE AUTOMOBILE:—1—What might be the trouble with a motor of the four-cycle type which runs nicely when at a moderate speed idle, but which stalls as soon as the throttle is opened and the load put on it? Sometimes opening the throttle has the same effect as cutting the ignition. Then as the throttle is closed to its former adjustment the engine resumes its smooth even running. But if the throttle is very slowly opened up it will attain to a high speed and if kept racing by slipping the clutch the car may be hauled for quite a distance. At other times it pulls very nicely. I have been unable to find any trace of this trouble.

2—What is the advantage of wrapping leaf springs with tape? I have frequently noticed the springs of racing and test cars so bound. Would it be any material help on a car in ordinary service?

3—Have sleeve valve motors of the Knight type been used to any extent in racing? Will this motor not heat more readily than the poppet valve type on account of two additional walls between the combustion gases and the water?

Bridgeville, Pa. L. J. BOWMAN.

—1—Dirt in the carbureter or in the gasoline can be the cause of trouble which is of a particularly mystifying nature.

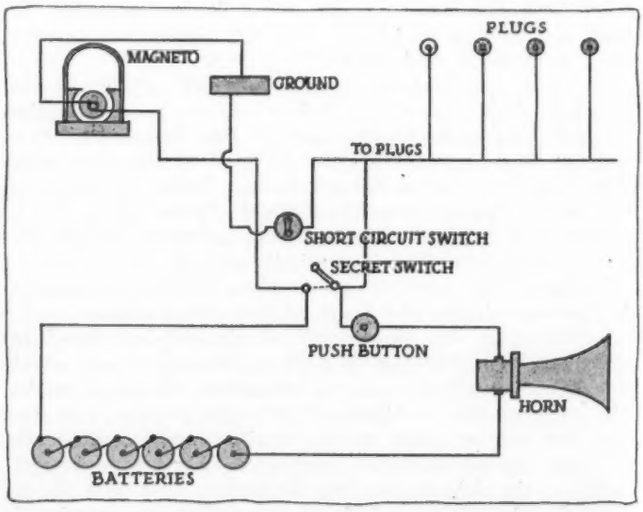


Fig. 4—This method of wiring would cause magneto to deliver current through batteries and horn. It is incorrect

The gas enters the float chamber of the carbureter very slowly and the result is that if there is a sudden demand for an extra supply of fuel such as would be the case where the throttle is opened quickly or the motor is called upon to pull against a stiff grade, the result is that there is not enough fuel to meet the demand and the motor dies. You have no doubt noticed that if you close the throttle for a short time while the car is running along and then open it again the motor will start all right and run for a short time before it stops again. The best way to remedy the trouble would be to take off the carbureter and clean it out. This can be done very nicely by compressed air if you are anywhere near a garage where they maintain pressure. The gasoline should be drained from the tank and the air shot through the gasoline feed pipe. To save future trouble in this respect always strain the gasoline through chamois. The garage man often protests against this, stating that there is a strainer in his line, but to be on the safe side it is better to use the chamois.

2—Springs are wrapped with tape to render them stiffer. On racing cars and on cars that are run over the roads at high speed on test work it is not desirable to have the more delicate spring action that is required in a car used for pleasure. In fact, such a suspension would be detrimental, as may readily be seen, because where the car is not slowing down for any bumps in the road, with a sensitive suspension the car would be jumping all over the road. Where shock absorbers of the friction type are used the friction member is drawn up much stiffer. It would not be of any use to a car in ordinary service unless you desire to go at high speed over country roads.

3—The Knight-equipped cars have figured prominently in many of the races held in Europe. In the last Belgium Grand Prix race a Knight car scored a victory. The results of that race were as follows:

Car	Bore and Stroke	Cyl. area	Speed Imposed
Minerva (Knight motor)	3.1 x 4.8	3 liters	40 m.p.h.
Hermes	2.8 x 4.7	2 "	35 "
Mercedes (Knight motor)	3.9 x 5.5	4.4 "	44.4 "
Opal	2.7 x 5.1	2.1 "	35.3 "
Lion-Peugeot	3' x 6.1	3 "	40 "
Schneider	3.2 x 5.5	3 "	40 "
German (valveless)	3.6 x 5.9	4 "	43 "
Sava	3.2 x 5.5	3 "	40 "
F. A. B.	2.9 x 4.7	2.2 "	35.5 "
Miesse	3.5 x 5.5	3.6 "	42 "
Ford	3.7 x 4	2.9 "	39.9 "

Knight motors do not show any tendency to heat up if the lubrication is properly attended to.

Installing Secret Control Switch

Editor THE AUTOMOBILE:—As I have been perpetually bothered by small boys who take a fiendish delight in hearing my electric horn and who are not adverse to running down the horn batteries, I intend installing a small switch that will throw the horn out of circuit when I leave the car.

I live in New York City and often use the car in a business way, leaving the car outside my office building for perhaps 2 or 3 hours at a time. During this time I am generally undergoing quite a strain on my nerves because I worry for fear some one with a love of automobiling and a small conscience may make off with the car. I worry, in fact, so much over whether the car will or will not disappear that I cannot keep my mind on my work while the car is standing outside. I intend to fit a small switch that will take care of this also.

It struck me that it would be a good scheme to combine the two switches into one so that I will merely have to throw the secret switch when leaving the car and the horn will be out of circuit and the magneto short-circuited at the same time. To do this requires a little fancy wiring and I have thought out two schemes, Figs. 3 and 4, which I submit for your consideration. Are both of these correct or if only one of them which is correct and why?

New York City. GOTHAMITE.

—Both the methods that you suggest are wrong as may be seen if you will trace through the wiring diagrams. Taking first, that shown in Fig. 3, you will notice that the magneto is perpetually short-circuited through the horn. The current would run from the magneto through the horn and then back to the magneto through the ground. As long as the magneto is grounded you should not ground any other circuit that can in any way communicate with the magneto because if you do the magneto will surely be short-circuited and you would not be able to get a spark at the plugs. In fact the magneto would probably blow out the windings of the horn if you should spin the motor while connected up in this manner.

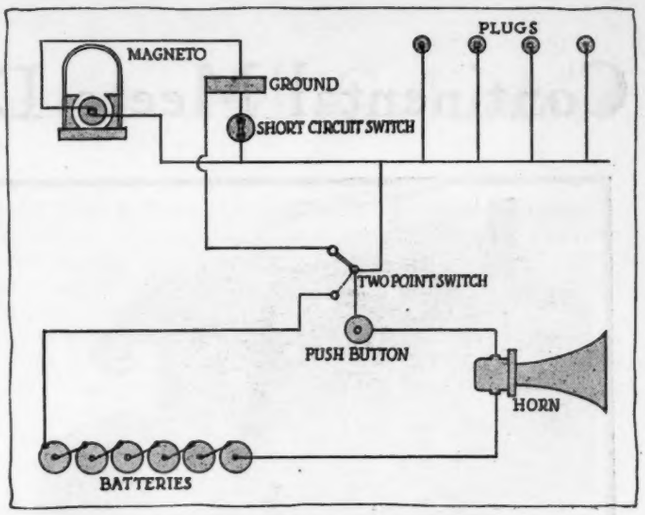


Fig. 5—Correct method for installing secret switch of two-point type to throw horn and magneto out

The plan that you outline in Fig. 4 is also bad. You will notice that the horn batteries and the horn close the circuit which you intend to break by means of the switch. The high-tension current would pass through the batteries and the horn and then to the plugs, closing the circuit. If the car was running on the magneto and you intended to stop by opening the switch which breaks the magneto circuit, or rather which is supposed to, the magneto would be forced to send the current through the batteries and the horn. This would probably burn out the horn.

The correct plan is that shown in Fig. 5. As you may see a two-point switch is used. This is no more complicated than a one-point as it can be of the type that is either in one circuit or the other. When one circuit is closed the horn is in circuit and so is the magneto. When the switch is thrown over the magneto is short-circuited and the horn circuit is broken.

Lamp Dimensions and Candle Power

Editor THE AUTOMOBILE:—Would you please give me the voltage, amperes required and candlepower of a set of standard Edison base passenger-car lamps? I would also like to know the diameters.

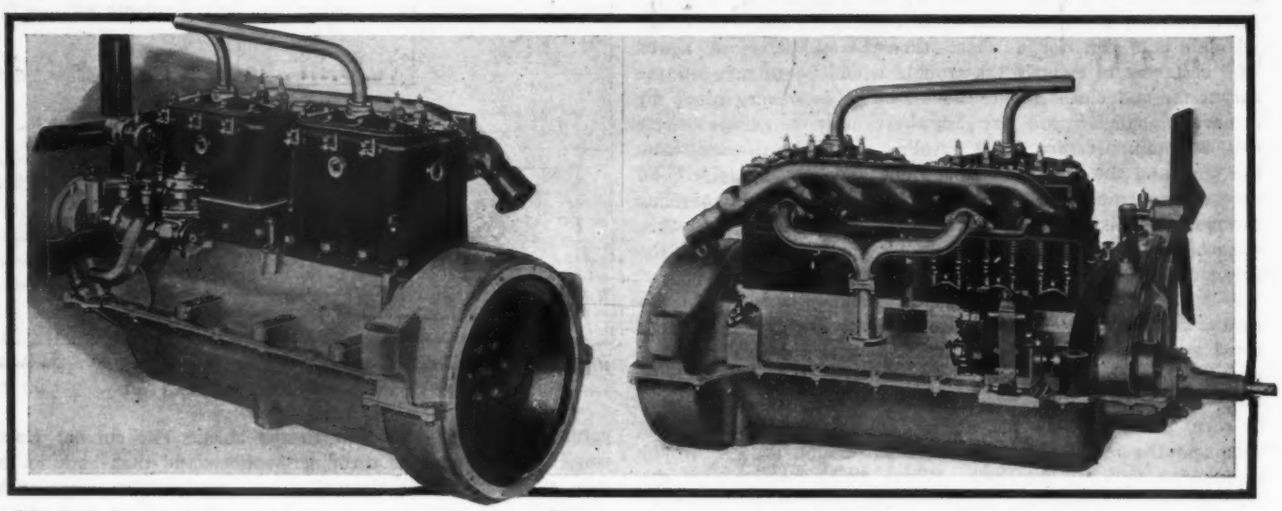
Altoona, Pa. READER.

—The following table will give you the data you require on standard Edison base lamps. By adding up the amperage of the lamps you intend using you will be able to tell what your battery requirements are.

DATA ON STANDARD EDISON BASE LAMPS

Style	Location	Diameter	Voltage	Candle Power	Amperes Required	Efficiency Watts Per Candle Power
1.	Head	2 1/16"	6	15	2.5	1.00
				18	3.0	
				21	3.5	
				24	4.0	
2.	Head	1½"	6	9	1.5	1.00
				12	2.0	
				15	2.5	
				18	3.0	
3.	Rear or side	1"	6	1.5	0.31	1.25
4.	Rear or side	¾"	6	1.5	0.31	1.25
				2.0	0.42	
				3.0	0.63	
5.	Rear or dash	¾"	3	1.0	0.42	1.25

Continental Meets Demand for Light Six



Two views of the Continental motor, showing design of magneto drive manifolds and valve covering

BELIEVING that the 1914 season will be featured by a demand for light sixes, the Continental Motor Mfg. Co. has brought out a motor especially designed to take care of that class of car. This motor is to be known as the 6P, and the company has provided itself with jigs and fixtures to meet the demand for this type of engine.

According to Continental practice the motor has been designed to be used independently or in the form of a complete power plant of unit construction with a multiple-disk clutch and three or four-speed selected gearset.

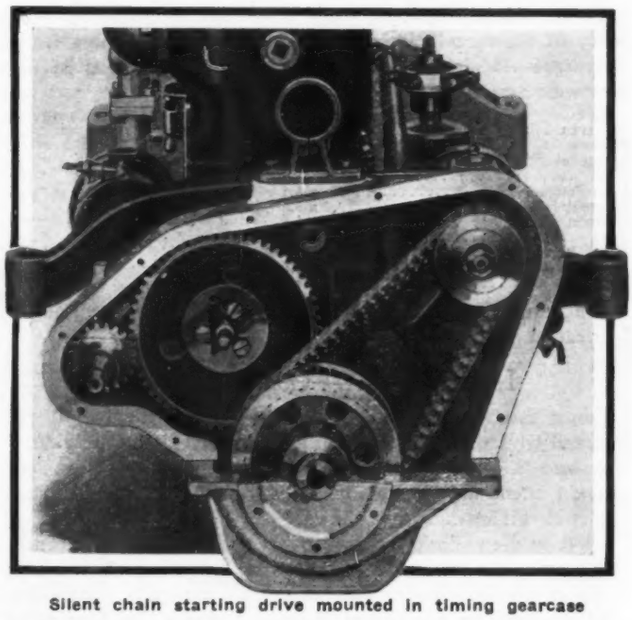
The motor has a bore of 3.75 inches and a stroke of 5.25 inches, giving a rating of 34 horsepower under the S. A. E rating. The cylinders are of the L-type cast in two blocks of three, giving a motor which is very short for a six-cylinder type. It will go under a 40-inch hood without crowding and the total weight, inclusive of flywheel and regular equipment, is but 600 pounds.

Three-point suspension is used with this power plant, thus avoiding any twisting strains on the crankcase. The pivot support is located at the front of the motor and is supplied with a bronze bushing and a lubricator so that there will be no chance of wear and noise at this point. The intake gas passage is cored inside each block cylinder and allows the use of a simple Y-shaped intake manifold.

To further carry out the idea of the designers in having a simple exterior, the valve action has been completely inclosed by two metal covers, each of which is held in place by a single wing nut. The covers can be quickly removed and act as a silence feature besides protecting the action from dirt and dust and permitting the stems and tappet rods to operate with plenty of lubrication.

Considerable latitude is allowed the car manufacturer in that any of the standard forms of equipment may be fitted. The motor can accommodate any type of magneto, dynamo or ignition and lighting device. It is also designed for either right or left drive and center control. The crankcase is built to accommodate any type of cranking motor mounting.

The oil is circulated by means of a gear pump, with positive multiple feeds, which forces the oil directly to the three main bearings, whence it is returned to the reservoir in the crankcase. The overflow from the front main bearings falls into a pocket in the timing gearcase, in which the large sprocket on the crankshaft and the silent chain is partly submerged. This carries oil up to the timing gears and lubricates all the bearings on the front end of the motor. In order that all the wells under the different connecting-rods be supplied with oil constantly and in equal amounts, the lubrication is forced by the gear pumps to each one of the wells in which the connecting-rods dip, so that an absolutely constant level is retained at any motor speed and under any condition of road travel.



Silent chain starting drive mounted in timing gearcase

Another noteworthy point is the silent-chain drive for starting purposes which runs in the timing gearcase. The chain runs in a constant bath of oil and is noiseless. It also drives the pump and commutator shaft and possibly an electric generator when not doing duty as an engine starter. The timing gears are helically cut.

The water circulation is well cared for by a powerful centrifugal pump, which pumps the cooled water directly under the valves to the hottest point.

Milwaukee Casts Exhaust with Cylinders

THE Milwaukee Motor Co. has brought out something new in the way of a block motor. This motor is made in either the six or four-cylinder type, and has several new features of prominence. Important among these is the fact that the exhaust manifold is cast integral with the cylinders. This gives the motor an exceptionally clean appearance and great neatness, the only exterior moving parts being the fan and the pump and magneto shaft.

The motor has a bore of 4.125 inches and a stroke of 5.5 inches. The cylinders are cast in one block and are of the L-head type. The valves are all on the left side of the motor. The opposite sides of the motor are shown at the bottom of this page, and it will be noted that the intake manifold enters the cylinder casting on the side opposite the valves. The exhaust manifold is contained in the cylinder casting along the valve side of the motor, as may be seen in the smaller of the two accompanying illustrations. The manifold terminates in a flat flange at the rear end of the block casting and is at this point connected to the regular exhaust pipe. The terminating flange is rectangular in shape and a bolt is located at each of the four corners for the purpose of attaching the exhaust pipe.

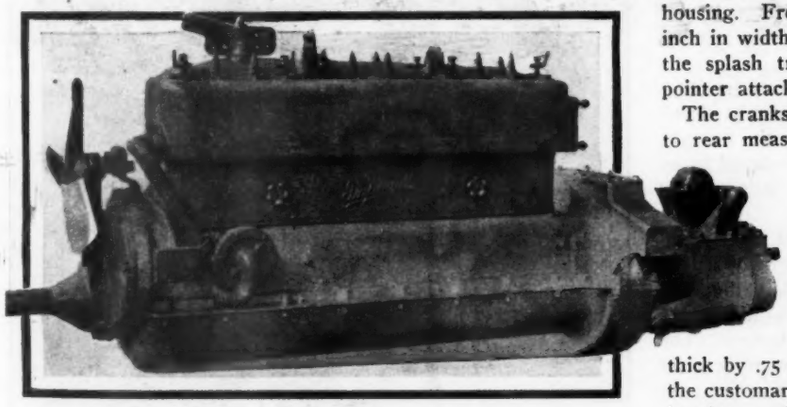
The valve action is fully inclosed by a single cover plate which extends the entire length of the motor just below the exhaust manifold. It can be removed by turning two wing nuts, thus exposing the entire valve mechanism. On the same side as the valve cover plate and located just below it in the crankcase of the motor is the centrifugal water pump. The water enters the block casting at the forward end and is carried through by the pump action to the manifold, which is bolted on the top of the cylinder casting, as shown in the illustration.

Three-point suspension is used on this motor, two supporting points being at the rear at either side of the crankcase and the third, a universal trunnion is located at the front of the motor behind the timing gearcase. This effectually protects the crankcase against racking strains due to the twisting of the frame. The pistons are 5.125 inches in length. Each carry three piston rings .25 inch wide. These are beveled at the end and are ground on the side to make a good joint with the piston. The piston pins are driven into the piston and oscillate in a bushing at the end of the rod. Above each boss is a small pocket to catch the oil that drips from the piston head.

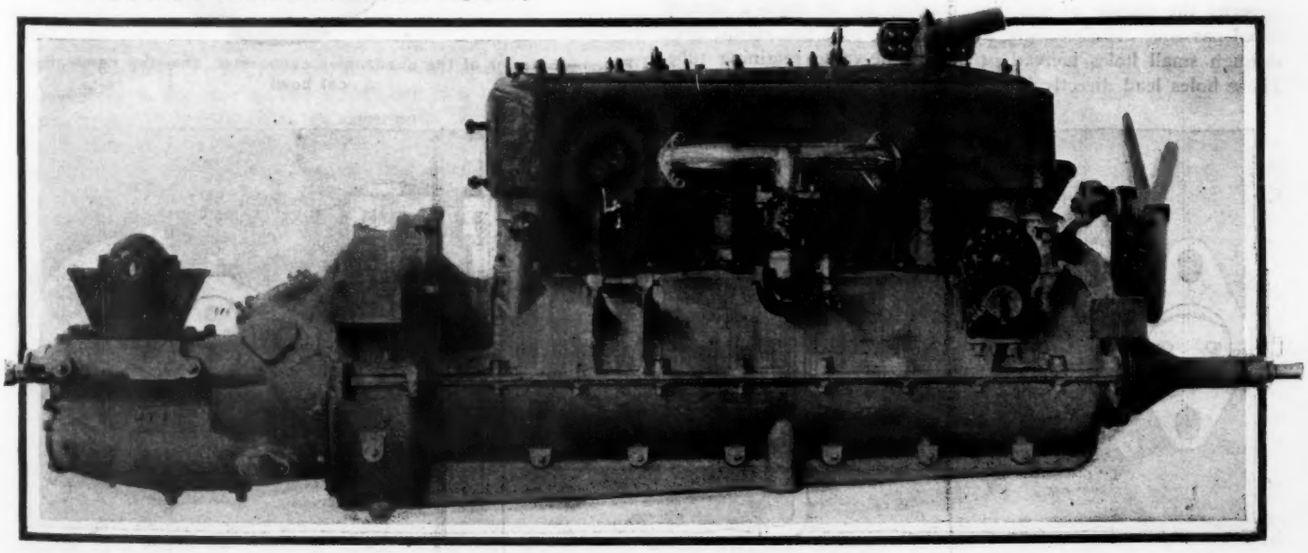
The lubrication is by constant-level splash. When the motor is not running the oil in the crankcase is all in the bottom of the oil pan and the flywheel housing, except what remains in the four splash troughs under the lower ends of the connecting-rods. When the motor is running the oil in the flywheel housing is picked up by the wheel and carried to its top, where it is thrown off by centrifugal force into a pocket on the side of the housing. From this point it runs along a square channel .375 inch in width, which is cast in the crankcase and is deposited in the splash troughs. The oil level may be determined by a pointer attached to a float operating in a guide.

The crankshaft bearings are three in number, and from front to rear measure 2.75, 3.125 and 4.5 inches in length. They are all 2 inches in diameter. The rear bearing cap is held in place by four through bolts. The center and front bearings are held in place by two through bolts each.

The gearset and clutch are contained in a bell-shaped casting which is a unit with the aluminum crankcase. The clutch is made up of twenty-five large and twenty-four small steel rings .0625 inch thick by .75 inch wide, bent at an angle of 20 degrees. It is of the customary disk clutch design. The gearset is carried on ball bearings and has three forward speeds.



Left side of Milwaukee motor, showing pump



Right or intake side of Milwaukee block six motor, illustrating simple manifold, magneto drive and unit construction

Quadruplex Carbureter Has Four Jets

THE Quadruplex carbureter, as its name implies, has four means of mixing the gasoline with air. Carbureters of the multiple-jet type and each of the four points of mixture has a separate jet. The carbureter, in fact, might be called a multiple-venturi type because there is a venturi-shaped passage around each jet. Fig. 2 gives the sectional view of the carbureter and also a view through each of the four jets.

The carbureter has an eccentric-float feed. The float is not circular as is customary but only extends part of the way around the hemispherical bowl which forms the float chamber. Another unusual point is that the gasoline enters directly through the bottom of the float bowl at its central point. The needle valve controlling the flow of the gasoline is located on the axis of the hemisphere forming the float chamber and is controlled by the customary lever arrangement which keeps the gasoline at its proper level. This part of the mechanism is clearly illustrated in Fig. 2. In the main section of the carbureter is shown the number 1 jet, A. This is the primary point of mixture and constitutes the fuel feed at low speed. The gasoline passes from the float chamber up the vertical passage to the jet which is shown located in the venturi. This jet corresponds directly to the needle valve in the ordinary type of carbureter and is directly adjustable by means of the slotted-screw head at the top of the needle. The primary mixture is drawn directly through the cored passage to the intake manifold and is unobstructed, save by a web in the carbureter casting through which the priming rod passes.

At very low speeds or when running idle the primary jet takes care of the carburetion. When the throttle is entirely closed the gasoline passes through a bypass D just above the primary venturi. This leads directly to the intake and is designed to be sufficient to run the motor when the butterfly throttle is entirely closed.

After the motor reaches a low intermediate speed, the second jet B comes into play. This jet is regulated by gravity. The valve is lifted off its seat by the suction induced in the inlet passage when the throttle is opened. The weight of this valve is fixed and should not be changed except at the factory. The adjustment, however, of the spray nozzle at the number 2 jet may be regulated in the same manner as that of first jet. As will be seen by close study of the illustration, the needle valve governs the supply of gasoline coming up through a central cored passage. The gasoline, after flowing past the needle, goes through small holes pierced in the needle-valve retaining tube. These holes lead directly into the narrowest part of the venturi opening. In this manner gasoline is taken from several points in the venturi opening and an atomizing effect is secured. The other needle valves in the other three jets are arranged in the same manner. When the gravity-seated valves are lifted the suction falls on the small holes in the venturi and the gasoline spray is drawn from them and rushes through the intake passage and mixes with the fuel taken from the primary jet.

The supplementary jet B and the primary jet A are the only ones requiring adjustment when the installation of the carbureter is made. Auxiliary jets C and D are set at the factory and require no change. It will be noted that the weighted valves B, C and D each operate under a different suction on account of their different weights. The mixtures furnished by each of the jets vary in richness and the jets are so designed that the proper mixture will be formed for any given speed. The three gravity valves are of different weights and when giving

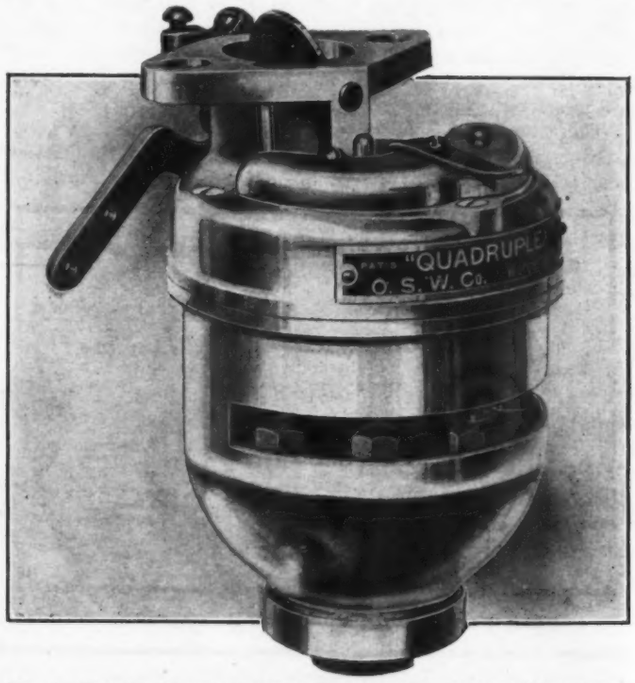


Fig. 1—Exterior of the quadruplex carbureter, showing hemispherical bowl

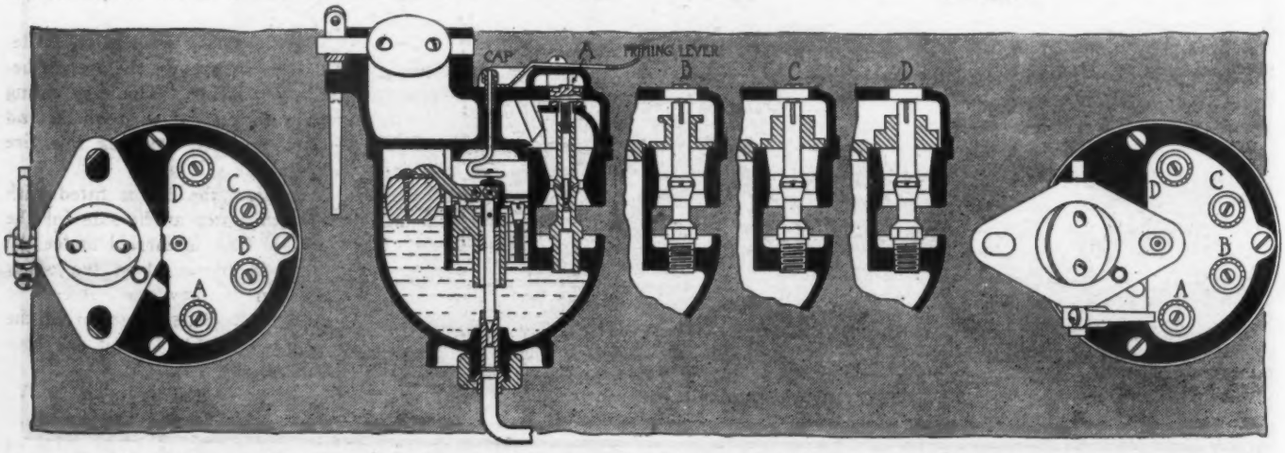


Fig. 2—Section through the Quadruplex carbureter illustrating the four venturi passages and jets

Side view of the Motokart, showing its size as compared to its driver

the maximum power of the engine all of them will be lifted.

The carbureter has no springs or cams and the only adjustment is for gasoline. Each of the four needle valves has numbered micrometer graduations operated from above by a screwdriver, and when once set the same adjustment can always be again reached by noting the numbers and recording them. The micrometer adjustments are shown in the plan views above the sections. The carbureter is furnished with a hot air intake mouthpiece clamped around the exterior of the carbureter and provided with a priming butterfly valve in the outlet to assist in starting in cold weather. The outlet is also arranged for the attachment of a flexible metal hose which can be led in almost any direction to the exhaust manifold upon which a hot air box is installed.

Paris Sweepers Save 12 to 60 Per Cent.

(*Continued from page* 1065)

control and very rapid action, so that it is possible for the operator to instantly cut off the flow of water to avoid splashing pedestrians.

The water pump is engaged by means of a short lever on the right-hand side of the driver's seat. Pivoted at the base of the dashboard are four levers. Two of these operate the piston valves at the inlet end of the main feed pipes, and the two others a similar pair of valves at the sprinkler end. These four being opened to the required degree, the operator confines his control to the guards.

The rotary brush is placed diagonally under the chassis. Diagonally across the frame from the differential housing to a point immediately to the rear of the dashboard, is a horizontal shaft driven by worm gearing from the differential, and having a bevel pinion at its forward end. The worm and worm wheel within the differential housing are constantly in mesh, but the horizontal shaft carries a dog clutch by which the movement can be interrupted through the operation of a side lever. This lever, which is placed immediately to the left of the driver, serves both to engage and disengage the clutch and at the same time to raise and lower the brush. The bevel pinion at the forward end of the diagonal shaft engages with another pinion having the same number of teeth on a vertical shaft just outside the frame member. At the base of this shaft is a second pair of bevel gears having respectively twelve and eighteen teeth, the driven pinion being mounted on the brush shaft. The relation of the sets of gears is such that the brush revolves at one-ninth the speed of the road wheels. As the brush has to be raised and lowered at frequent intervals, and has also to be regulated for height as the bristles become worn, the vertical shaft is telescoping and is also incased by a couple of telescopic tubes. As a final protection, a leather boot is placed around the entire shaft.

New Light Delivery Car

The Motokart Is the First Four-Wheeled Vehicle of This Type To Appear on the Market—It Is Designed for Use in Cities

ALTHOUGH there are a number of light, three-wheeled delivery motor vehicles on the market, it remained for the Tarrytown Motor Car Co., Inc., to bring out the first four-wheel light car especially designed for urban parcel delivery service. This car is adapted to the delivery requirements of butchers, grocers, dairymen, bakers, laundrymen, florists, milliners, etc. An idea of the size of the machine may be gained from the accompanying illustration, which also indicates the light but durable construction used. Seeking for a trade name for the vehicle which would be distinctive, the company adopted the original word "Motokart."

The power unit of the car consists of a two-cylinder motor with cylinders 3.625 by 4 inches which delivers 10.53 A. L. A. M. horsepower. Cooling is effected by the thermo-syphon system. The transmission of the power is by means of a friction drive which provides a wide range of speeds and at the same time precludes the possibility of stripping gears, one of the greatest troubles when inexperienced drivers are given charge of delivery cars using the gear type of transmission.

In appearance the car somewhat resembles the motorcycle or cyclecar types of motor delivery vehicles, the main difference from the motorcycle consisting in the use of four wheels instead of three. As may be seen in the illustration, the driver is seated at the rear of the parcel box directly over the rear axle.

The operation of the car is extremely simple and all actuating levers may be seen in the illustration, comprising the pedal for the clutch, the steering column and wheel and the lever for changing the speed on the friction disk mounted underneath the steering wheel.

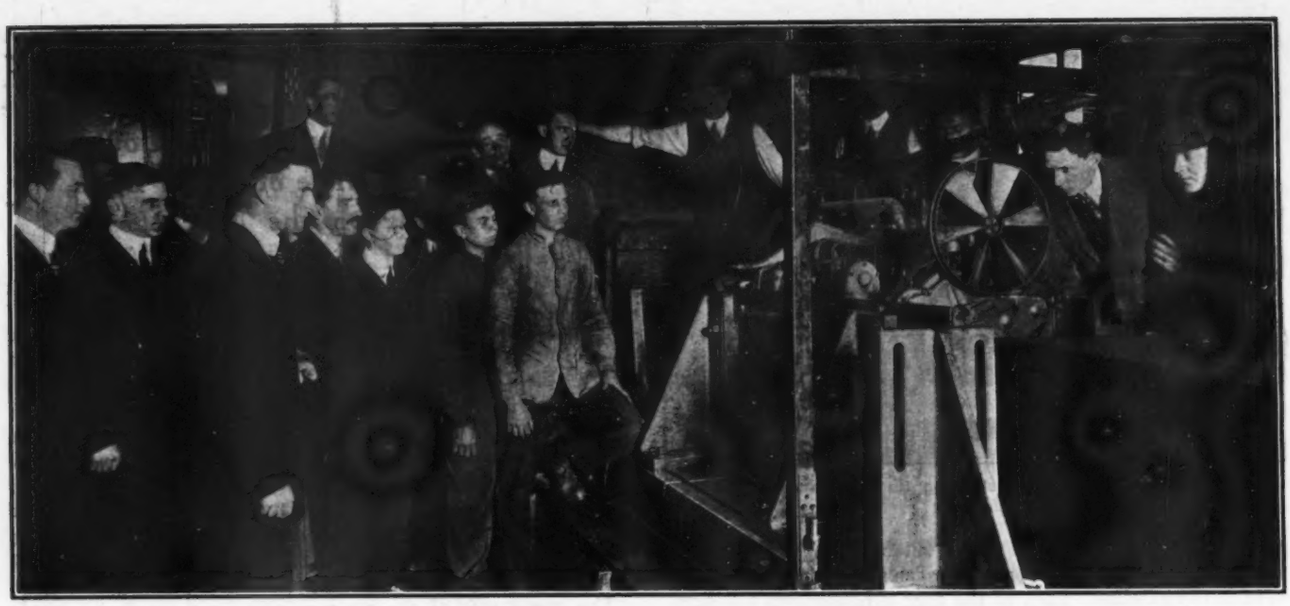
Large Parcel Box

The machine has a pressed steel frame, the wheelbase being 65 inches while the tread is 44, the designers having given considerable attention to keeping the car as small as is logically possible in order to facilitate handling in crowded streets. However, the dimensions of the parcel box have been made as large as the size of the vehicle permits, being 48 inches long, 34 inches high and 32 inches wide, the cubical area of the box being 30 square feet. The load capacity of the vehicle is 400 to 500 pounds.

The body used is of metal and the spring suspension is designed to protect fragile merchandise, the springs themselves being of the semi-elliptic type 26 by 2.5 inches. The easy riding qualities of the car are enhanced by the use of wire wheels and pneumatic tires, the lightness of the vehicle insuring low tire and maintenance cost.

As may be seen from the illustration, the car is fitted with mud-guards over each wheel and with a step at the side for the entrance of the driver. The gasoline tank is carried under the seat, while the cooling water tank is contained in the upper part of the rear portion of the parcel delivery box. Access to the parcel box is through doors at the front, the interior of the box permitting of various shelf arrangements to suit the convenience of demands of various trades.

The company has established a factory at Tarrytown, N. Y., its New York office being at 1790 Broadway. It is expected that deliveries will be begun not later than June 15. The price of the machine is $400.



An interested gathering of engineers watched the conclusion of the 300-hour run of the Packard motor

Full Report of Packard Motor Test

Details of the Motor Performance During 300-Hour Run Given Out by A.C.A.

NEW YORK, May 20—The complete report of the 300-hour test of a Packard motor by the testing laboratory of the Automobile Club of America was given out this evening by Herbert Chase, laboratory engineer, and is printed in full herewith. This report shows that the motor made a non-stop run for 300 hours, the only stop that actually occurred during the test being one of 45 seconds caused by air in the gasoline feed pipe, but as this stop was not due to the motor the run must be considered a non-stop one.

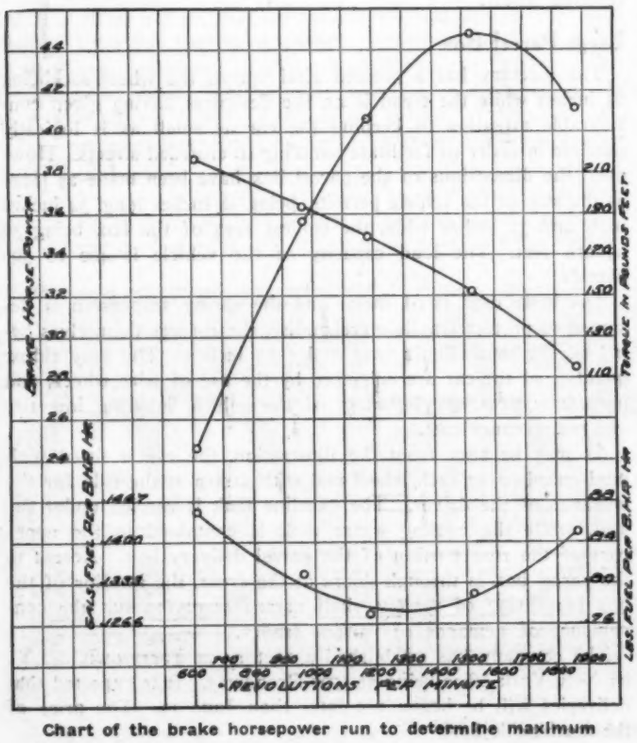


Chart of the brake horsepower run to determine maximum

During the test the motor showed an average horsepower of 35.7, the crankshaft speed averaging 1,208 revolutions per minute.

Fourteen hundred and thirty eight gallons of gasoline were consumed, or an average of 4.79 gallons per hour, this being equivalent to .134 gallon per horsepower-hour. In weight the gasoline consumed amounted to 8,671.4 pounds. It was of 63 Baumé gravity, or a specific gravity of .727.

During the 300 hours 321.9 gallons of lubricating oil were used, or 1.07 gallons per hour of test. By weight the oil amounted to 2,319.5 pounds. During the first part of the test Invader crystal medium oil was used and during the last part Polarine.

The average temperature of the water entering the cylinder jackets was 125 degrees Fahrenheit; the average temperature of the water leaving the jackets was 140 degrees. Instead of using the car radiator a water tank, as customary in all motor tests, was employed.

The report shows that two adjustments of the exhaust valve tappet on No. 1 cylinder, one at the 147th hour and the other at the 152nd hour. Two spark-plugs were replaced, one at 106th hour, the other at the 128th hour. The screw covers above certain of the valves were tightened. The screws which fasten the air valve cage of the carbureter were tightened once during the run.

The report shows that during the test the throttle was wired wide open from start to finish and the spark at the full-advanced position.

The motor was a Packard 1914 38-six, familiarly known as the Packard small six. Its bore and stroke are 4 by 5.5 inches, and has an S. A. E. rating of 38.4 horsepower.

According to the rules governing the test, printed in full in THE AUTOMOBILE May 1, page 926, a preliminary series of short tests of 3 minutes each was made to determine the maximum horsepower of the motor, which showed 44.9 horsepower at 1,533 crankshaft revolutions per minute. During the duration test of 300 hours the rules called for an average horsepower of more than 70 per cent. of this, in other words, the average horsepower

for the 300 hours was to be somewhere above 31.43 horsepower.

The horsepower chart reproduced herewith shows the power curve for the entire 300 hours, the vertical lines marking the time off into 5-hour intervals. According to this chart the lowest horsepower mark appears at the 106th hour at which time the first spark-plug was changed. The changing of the second plug at the 128th hour does not show any drop in power on the chart. Slight downward projections on the power curve are shown at the 147th and also at the 152nd hour, when the tappet was being adjusted.

The official record of the tests shows that it began at 10:43 Saturday night, May 3, and was completed at 10:43 Friday afternoon, May 16, exactly 12.5 days. Running a motor at an average crankshaft speed of 1,208 crankshaft revolutions per minute gives a total of 21,744,000 revolutions. Were the motor running in the car at this speed and with the gear ratio used it would be averaging slightly in excess of 37 miles per hour and during the 300 hours would cover a mileage of 11,100. Roughly calculating it is 4,000 miles from New York to San Francisco, so that this test in mileage is equivalent to twice across the continent and from New York to beyond Salt Lake City on the third trip.

The complete report follows:

"This is to certify that the Technical Committee of the Automobile Club of America has tested the Packard motor, manufactured by the Packard Motor Car Co., with the following results:

"ENDURANCE RUN—The motor ran continuously with wide-open throttle and fully-advanced spark for a period of 300 hours at an average speed of 1,208 revolutions per minute. During this interval the average brake load at 1 foot radius was 155.1 pounds, giving a resultant average brake-horsepower of 35.7. The lowest horsepower reading for any 15-minute interval during the entire 300 hours was 28.7.

"The total fuel consumed during the run was 8,671.4 pounds, equivalent to 1,438 gallons, an average consumption of 0.81 pound (0.134 gallon) per brake-horsepower-hour.

"The total oil consumed was 2,319.5 pounds, equivalent to 321.9 gallons, an average of 1.07 gallons per hour. (See chart No. 1 and Table No. 1 for record of power variation.)

"RUNS AT VARIOUS SPEEDS—Prior to the endurance run a series of short runs, each of 3 minutes' duration, with throttle wide open and spark set for maximum power, was made to determine the maximum power of the motor.

"The maximum power developed was 44 horsepower at 1,533 crankshaft revolutions per minute. (See Table No. 2 and Chart No. 2 for record of torque and power at various speeds.)

"PARTICULARS REGARDING MOTOR—The motor, which is designated by the manufacturers as model 13-38, is of the four-cycle type having six cylinders of 4-inch bore. The stroke is 5.5 inches. The valves, which are of the poppet type, are all located on the same side of the motor and are actuated from a single camshaft.

"The weight of the motor, including flywheel, pump, fan, carbureter, all manifolds, magneto and complete ignition system, self-starter, motor, clutch and its casing, brake starter and clutch, pedal levers and half of universal joint, was 973 pounds.

"LUBRICATION—The motor was not taken down for examination, but the owners state the lubrication is accomplished as follows: A gear pump draws oil from the sump and delivers it to the main bearings under pressure. From these it flows through the hollow crankshaft to the big-end bearings and thence to the wristpins through pipes attached to the connecting-rods. The oil is also delivered to the cylinder walls for lubrication of the pistons passing through a valve which in the normal operation of the car is opened and close by the accelerator pedal. During this test the valve was wired wide open.

"The exhaust from the motor was smoky and considerable carbon deposits were observed on the exhaust valves after the test.

"Two different brands of oil were used during the test, namely, Invader crystal medium and Polarine.

"FUEL—The fuel used during the test was gasoline having an average specific gravity of 63 degrees Baumé, equivalent to .727 specific gravity.

"CARBURETION AND IGNITION—The Packard carbureter was

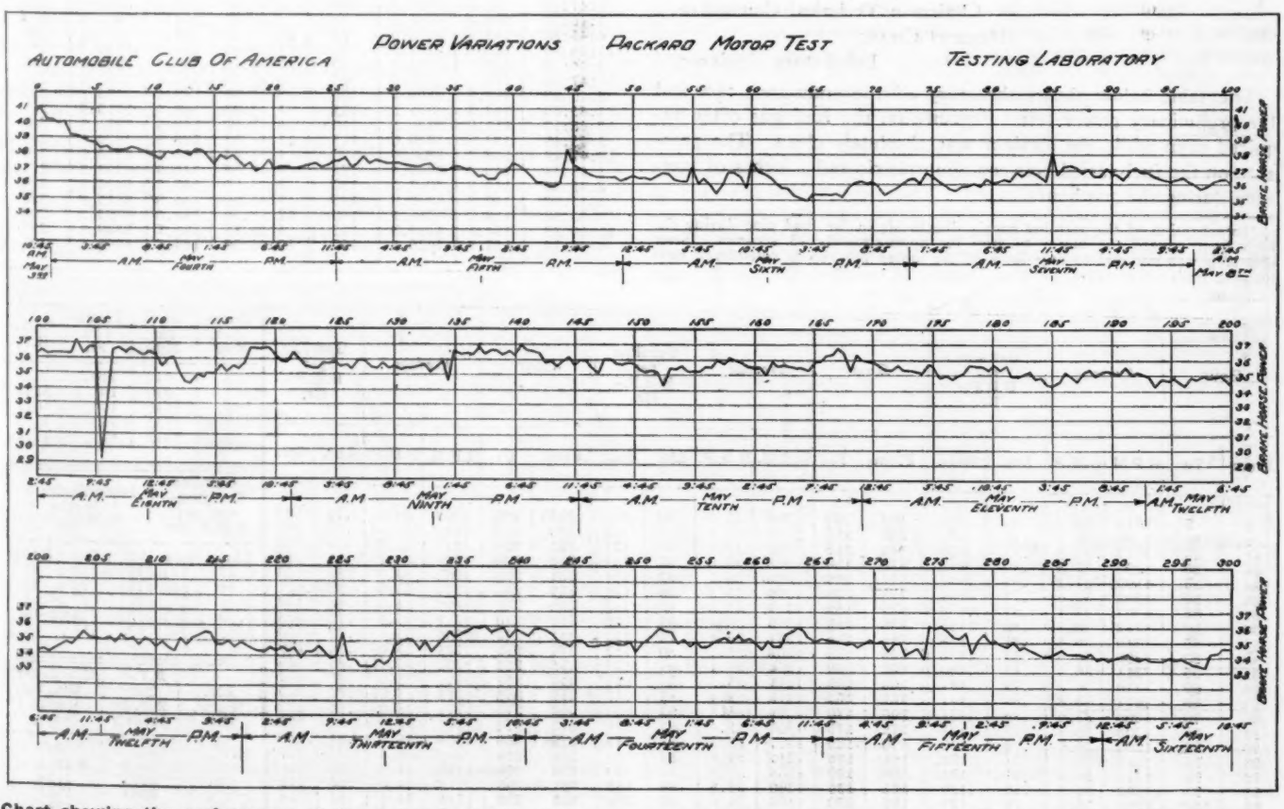


Chart showing the performance of the motor during the 300 hours, plotted on average horsepowers at each half hour during entire run

used, while the ignition was furnished by a Bosch model 5 DU 6 magneto.

"Cooling and Exhaust—The motor was cooled during the test by water circulated by a centrifugal pump. The average temperature of the water entering and leaving the motor was 125 degrees Fahrenheit and 140 degrees, respectively.

"The motor exhausted through a 30-inch length of 2-inch pipe into an expansion chamber having a 3-inch standard pipe outlet.

"During the endurance test a blower was used to direct upon the motor a blast of air having a velocity of about 30 miles per hour. The fan, which is regularly used with the motor, was also kept in operation.

"The average temperature of the air during the test was 68 degrees Fahrenheit; and the average barometer readings 29.19 inches of mercury.

"Adjustments.—The following adjustments were made during the 300-hour run.*

"During the 147th hour the lock nut on the exhaust valve tappet of No. 1 cylinder was found to be loose and the tappet in such position that the valve did not seat properly. The tappet was screwed down and locked. It was later found that this tappet had been set for more clearance than it had at the start of the test. It was consequently reset at 152d hour, to its original position, where it remained to the end of the test. While this adjustment was being obtained the power fell momentarily, but aside from this the adjustments did not result in any greater variation in the power developed than were recorded during periods when no adjustments were made.

"Two spark plugs were replaced without stopping the motor. One during the 106th and one during the 128th hour.

"The screw covers above certain of the valves were tightened.

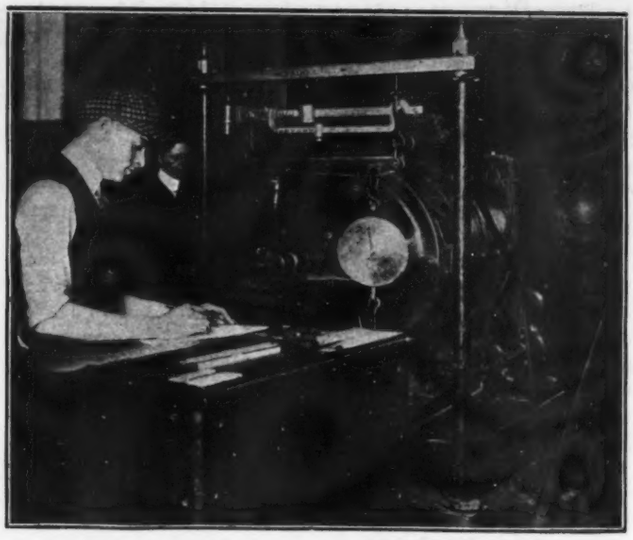
"The screws which fasten the cage containing the carbureter air valve in place were also tightened once during the run.

"A slight leak around the gland on the water pump was present during the greater part of the test, but no adjustment thereof was made."

F. R. Hutton,
Chairman Technical Committee.
Herbert Chase,
Laboratory Engineer.

The table below shows the story of the endurance test and the preliminary power test. Pressure on the fuel was often required even while the strainer was absolutely clean. The pressure on the fuel varied between atmospheric and 2 inches of mercury during the 300 hours.

*Interruption of the gasoline supply due to air in the feed pipe during the 60th hour caused the motor to stop for approximately 45 seconds. Since this stop was not due to any fault of the motor the run is considered continuous under the rules.



Operation desk at A. C. A. testing laboratory

Time, H., M., S.	Fuel Consumed, Lbs.	Total Fuel Consumed, Lbs.	Hours Run	Time, H., M., S.	Fuel Consumed, Lbs.	Total Fuel Consumed, Lbs.	Hours Run
10:43:00	157.2	159.2	5	9:45:35	147.9	4774.3	155
8:50:15	156.3	315.5	10	2:48:00	146.6	4920.9	160
1:54:30	155.0	470.0	15	7:46:20	145.4	5068.2	165
6:45:25	148.9	618.9	20	12:45:05	149.0	5217.2	170
11:59:05	158.7	767.3	25	5:45:15	147.1	5364.3	175
4:46:20	147.1	914.4	30	10:45:15	143.1	5516.4	180
9:50:45	155.1	1045.7	35	3:45:05	144.5	5660.9	185
2:46:15	149.3	1194.8	40	8:46:20	149.0	5810.9	190
7:48:25	147.5	1332.3	45	1:45:10	145.7	5955.9	195
12:46:30	149.4	1482.9	50	6:45:20	142.6	6098.5	200
5:46:10	138.1	1621.0	55	11:45:35	135.4	6235.0	205
10:47:00	139.5	2062.5	60	4:46:40	146.2	6368.7	210
3:46:15	150.3	2212.8	65	9:53:00	133.2	6508.1	215
8:47:40	140.2	2352.3	70	2:45:10	140.4	6660.9	220
1:46:20	138.4	2491.7	75	7:47:00	144.6	6805.4	225
6:45:30	142.3	2630.0	80	12:45:20	145.5	6950.9	230
11:46:20	142.6	2772.6	85	5:49:45	144.9	7114.7	235
4:46:20	149.9	2922.5	90	10:46:10	133.7	7248.4	240
9:47:20	142.5	3065.0	95	3:47:30	139.0	7393.4	245
2:45:20	143.2	3208.2	100	8:51:20	147.4	7556.1	250
7:45:00	147.3	3355.5	105	1:45:00	144.4	7710.5	255
12:48:15	151.0	3506.5	110	6:47:00	140.8	7851.1	260
5:45:40	133.5	3640.0	115	11:46:05	128.6	7979.6	265
10:47:45	148.3	3800.9	120	4:45:45	146.4	8126.0	270
3:45:35	146.5	3947.4	125	9:46:05	146.9	8272.5	275
8:45:30	149.9	4097.3	130	2:45:30	143.3	8415.8	280
1:45:50	142.8	4240.9	135	7:46:00	146.0	8555.9	285
6:46:50	118.2	4358.1	140	12:45:30	146.6	8702.5	290
11:46:25	134.5	4489.3	145	5:46:25	146.7	8849.6	295
4:45:30	142.5	4626.8	150	10:46:00	144.5	8994.1	300

Hour		Average		Gasoline per B.H.P.-Hr.		Hour		Average		Gasoline per B.H.P.-Hr.		Hour		Average		Gasoline per B.H.P.-Hr.	
From	To	R.P.M.	B.H.P.	Lbs.	Gals.	From	To	R.P.M.	B.H.P.	Lbs.	Gals.	From	To	R.P.M.	B.H.P.	Lbs.	Gals.
0	5	1213	38.7	.81	.134	101	105	1209	36.7	.80	.133	201	205	1207	34.6	.78	.129
6	10	1195	38.1	.82	.136	106	110	1215	35.5	.85	.142	206	210	1220	34.4	.85	.142
11	15	1179	37.8	.82	.136	111	115	1203	35.0	.76	.127	211	215	1211	35.0	.76	.126
16	20	1207	37.3	.80	.133	116	120	1208	36.0	.82	.131	216	220	1205	34.8	.81	.133
21	25	1199	37.2	.85	.142	121	125	1208	35.7	.82	.136	221	225	1202	34.3	.84	.139
26	30	1202	37.4	.79	.131	126	130	1200	35.5	.84	.140	226	230	1219	33.9	.86	.141
31	35	1207	37.1	.84	.138	131	135	1213	35.5	.80	.133	231	235	1219	34.8	.83	.137
36	40	1212	36.7	.81	.133	136	140	1213	36.4	.65	.108	236	240	1217	35.8	.75	.123
41	45	1210	36.4	.81	.134	141	145	1201	36.1	.75	.123	241	245	1206	35.4	.79	.130
46	50	1200	36.5	.82	.136	146	150	1208	35.7	.80	.132	246	250	1215	35.0	.84	.139
51	55	1211	36.4	.78	.130	151	155	1204	35.1	.84	.139	251	255	1221	35.3	.82	.136
56	60	1219	36.2	.79	.131	156	160	1211	35.3	.83	.138	256	260	1215	35.1	.80	.132
61	65	1221	35.8	.84	.141	161	165	1210	35.4	.82	.137	261	265	1212	35.2	.73	.120
66	70	1209	35.6	.79	.131	166	170	1224	36.3	.82	.135	266	270	1211	35.0	.84	.132
71	75	1208	36.1	.77	.128	171	175	1209	35.4	.83	.139	271	275	1207	34.9	.84	.138
76	80	1202	35.9	.79	.132	176	180	1207	35.2	.81	.135	276	280	1209	35.3	.81	.133
81	85	1208	36.9	.77	.128	181	185	1211	34.9	.83	.136	281	285	1205	34.5	.85	.137
86	90	1211	36.9	.81	.134	186	190	1208	35.0	.85	.140	286	290	1210	34.4	.85	.141
91	95	1192	36.5	.78	.130	191	195	1200	34.8	.84	.138	291	295	1216	34.0	.86	.142
96	100	1190	36.5	.78	.129	196	200	1198	34.6	.82	.136	296	300	1211	34.1	.85	.144

Duration, Mins.	Rev. per Min.	Torque Lbs. Ft.	Brake H.P.
3	612	210.8	24.3
3	970	193.2	35.7
3	1191	179.6	40.7
3	1533	153.5	41.9
3	1870	115.5	41.1

Gasoline Consumption per B.H.P.-Hr.		Temperature F° Jacket Water		
Lbs.	Gals.	In	Out	Range
0.87	.128	125	152	27
0.81	.135	124	145	21
0.77	.128	121	140	19
0.79	.131	122	138	16
0.85	.141	123	137	14

Lbs. Water, Min.	B.T.U. per Min. to Jackets	B.T.U. per Min. to Useful Work
.....	....	1043
84	1764	1513
141	2679	1728
179	2864	1905
....	....	1745

Accessories for the Automobilist

FLEXILYTE—A clever and useful accessory has been devised by the L. A. Williamson Co., 1790 Broadway, New York City. The device is known as the Flexilyte, Figs. 1 and 2, and is constructed to serve as a trouble-hunting and general search light for automobilists, both on the road and in the garage. Fig. 1 shows the appearance of the Flexilyte very well, it being composed of a gun-metal casing to which the holder H, formed like a steering wheel, is attached by means of a pin. The rim of the drum-shaped casing is cut at C so as to permit the wire-cord to pass through it which leads from the battery terminals to the hub-formed lamp socket arranged centrally in the drum-shaped casing of the device. On the back side of the casing there is a small pawl P engaging flat serrations in the rear wall of the socket-hub, so that if the latter is turned in one direction, the reversal of the movement is prevented by P. The piece Q, pivoted around a pin secured to and above the surface of the socket wall, is turnable around this pin; it is ordinarily held in engagement with a hole in the socket wall, its end carrying a ball which fits into the hole. If this end is free, the piece Q may be thrown over toward the casing periphery and the socket-hub may be so turned that the pawl prevents its return. By freeing the pawl from the serrations, the hub is permitted to turn by pulling the cord, so that any desired length of wound wire may be pulled out of the casing and rewound by turning the piece Q. The ends of the cord are fitted with spring-clip terminals which may be secured to any type of battery poles. Fig. 2 shows an obviously very useful application of the Flexilyte device, one of the many cases where the powerful tungsten bulb can be worked to advantage.

Packard Valve Cap Tool—Asch & Co., 1777 Broadway, New York City, handle the valve cap tool shown in Fig. 3, which is specially designed to fit Packard motors. The tool consists of a hexagonal steel prism into the side of which a steel rod is fitted to form a handle. The hexagon is so proportioned as to exactly fit the depression in Packard valve caps, so that it is extremely easy to remove the latter by inserting the tool and giving it a turn or two. Such a device is, of course, a great time saver in a repair shop. Tools to fit the valve caps of many other prominent makes will be brought out soon.

GO Motor-Speeder—Fig. 4 illustrates the GO Motor-Speeder, made by the Fudge Bros. Mfg. Co., Marion, Ind. This device has the purpose of supplying warm auxiliary air for preheating and completely breaking up the mixture, and supplying it in the correct amount, no matter what the throttle opening of the motor might be. To attain this end, the Fudge concern has combined the device proper, D in Fig. 4, which is a cup all closed with the exception of a screened air intake, with a valve contained in D and connected by C to the throttle rod R of the carbureter, so that any movement of the latter produces a corresponding adjustment of the speeder valve. The air taken in through the hole of D passed through the compressing coupling at the lower end of the device and through a tube C coiled around the exhaust pipe to the intake manifold, which it enters through a nozzle N formed with a number of small holes. To regulate the capacity of the auxiliary air lead, primarily, a cock is placed just ahead of the nozzle N. This device has the great advantage that when its capacity has once been adjusted by properly positioning the cock, it remains in the right adjustment and requires no further attention. It may be mounted in a very short time, being attached to the motor frame by means of the bracket seen in Fig. 4 and after this it serves for any length of time without demanding any attention.

Fig. 2—Use of Flexilyte lamp on the road

Rust-No Graphite—The same company also handles the Rust-No graphite stick for preventing the tires rusting onto rims, Fig. 7. This article is composed of graphite powder held together by an oily binder and being formed in the shape here illustrated. The compound is dry and hardly blackens the hands; at any rate, one end is covered with paper which is printed with instructions for the use of it. It is used for rubbing the contacting faces of rims and tires before mounting the latter on the former. The graphite then forms a thin layer between rubber and metal and prevents the adhesion of the two materials. The stick may also be used for the lubrication of such parts as spring leaves by rubbing the latter with it, or shaving some of the graphite and squeezing it between the leaves.

Taylor Noil Tire Pump—The Taylor Mfg. Co., P. O. Box 485, Chicago, Ill., is the maker of a new engine-driven tire pump, which is permanently installed on the motor or chassis frame and is operated by a sliding gear which may be brought into engagement with a half-time or other pinion, the engagement and disengagement of the gears being controlled by means handled by the driver. The pump is of the reciprocating piston type. The piston is of mushroom design, somewhat similar in shape to a valve.

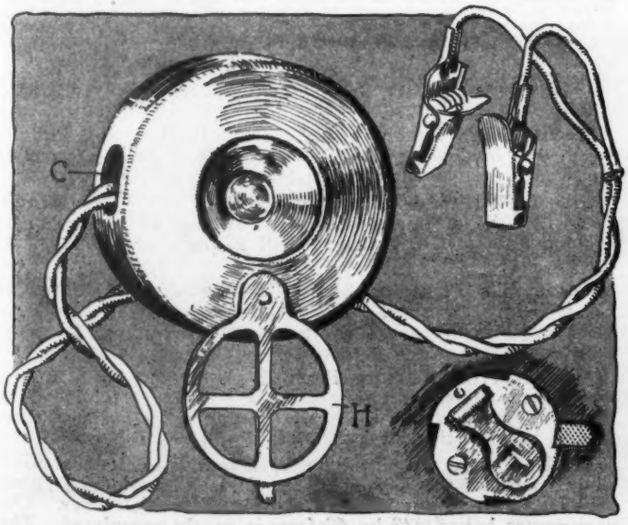


Fig. 1—Flexilyte trouble-hunting lamp

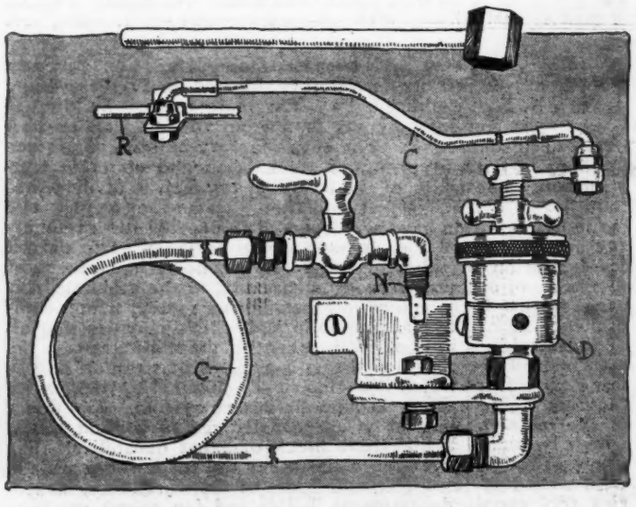
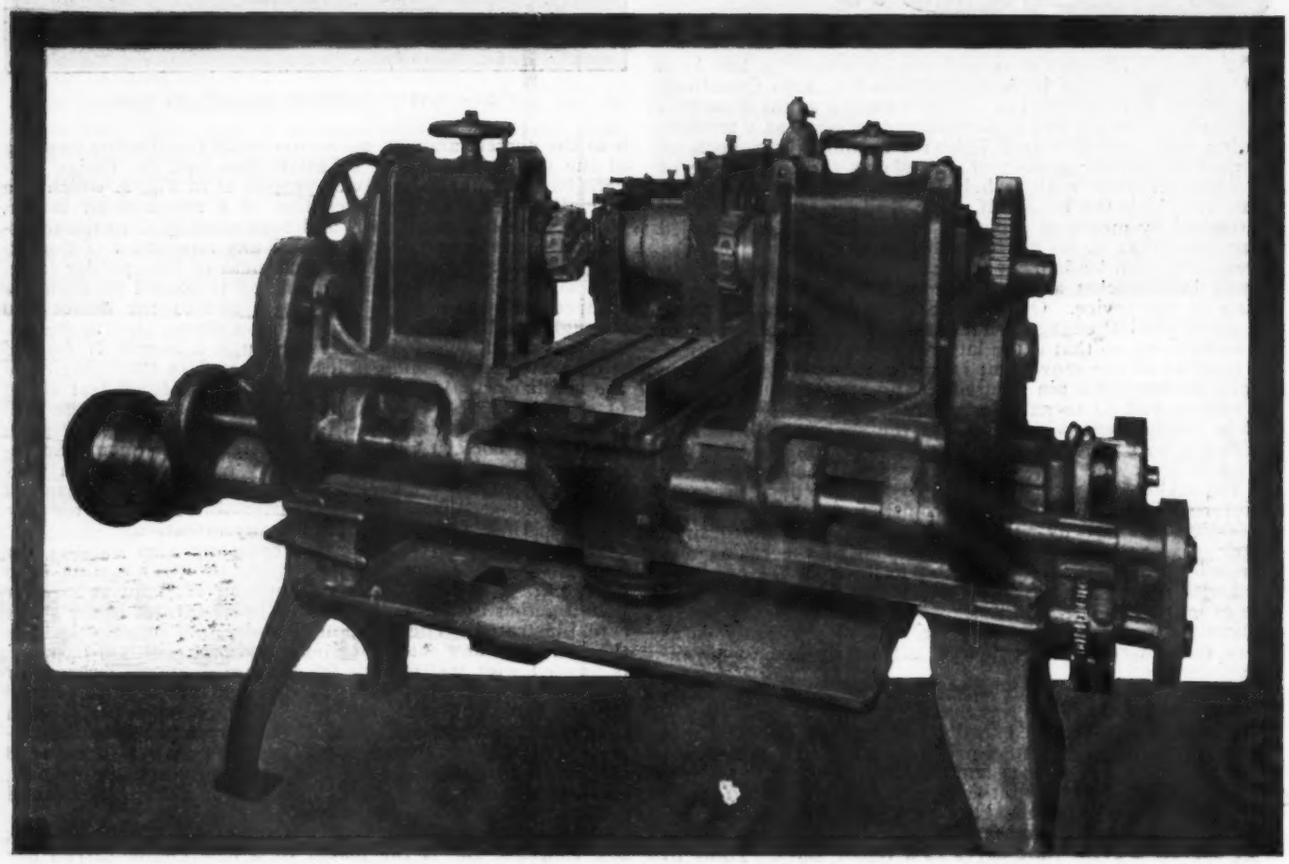


Fig. 3—Valve cap tool. Fig. 4—Motor-speeder

Factory Miscellany



Milling machine for finishing Moon cylinders employed in the factory of the company at St. Louis, Mo.

IN comparing the advantages of the T-head and L-head types of cylinders laymen frequently omit the consideration of machining. It is evident that it will cost more to do machine work on two sides of a casting than on one because there will be double the number of set-up jobs. Where a moderate-priced car uses the T-head type of cylinder it is evident that machines will have to be employed to keep the cost of labor on the cylinders down to the lowest possible point. The machine shown in the above illustration does this in the Moon factory at St. Louis. This machine is capable of handling eight cylinders at one time and all of the outside milling work on these cylinders is performed in two operations and by one man. The first operation consists in the milling of the tops and bottoms of the cylinders at the same time. After these are completed, the cylinders are turned upright and both sides are milled. This includes the milling of the intake and exhaust manifold bosses, the water connections and the valve covering plates. One man handles all the set-up work and no time is lost in this respect as he sets up one pair of cylinders while another pair is being milled. One man can turn out forty cylinder castings in a day. Naturally, this machine is an important economic factor.

NEW DUFF PLANT—The Duff Mfg. Co., recently moved into its new factory, located on Preble avenue, N. S., Pittsburgh, Pa. The main factory building is 550 feet long by 125 feet wide, affording an area of over 68,000 square feet. The entire factory building and office building is built fireproof, of steel, brick and concrete construction. The width of the building, 125 feet, is divided into four bays, 30 feet, 35 feet and then two 30-foot bays. The crane bay and side bays are designed to provide for a telpherage system and all roof trusses are so designed as to permit the operation of the crane and telpher hoist in connection therewith in practically every square foot of the building. Another feature is the central oil distributing system which comprehends all of the machine shop and which provides that all of the machines are fed from a central point by gravity, the returned oil being passed through a series of strainers into a large tank, from which it is electrically pumped to the gravity tank and again passed through the entire system. The floors of the main machine shop are constructed of asphalt block, which is mainly a limestone block of great durability. The floors of the heat-treating department and forge room arela id with a hard paving block, and floors of the warehouse, lavatories, tool supply departments, boiler and fan rooms are concrete. There are no solid partitions in the entire factory building, as heavy wire screening, 10 feet in height is used exclusively to separate the stock rooms, etc.

Hewitt Plans Factory—The Hewitt Rubber Co., Buffalo, N. Y., has filed plans for a new three-story brick factory at 240 Kensington avenue, to cost $175,000.

Gibson Will Build—The Gibson Motor Car Co., Pittsburgh, Pa., will build an automobile plant as soon as a site can be decided upon. The company will manufacture commercial trucks.

Automobile Plant for Louisville—The Crown Motor Car Co. is being organized in Louisville, Ky., with a capital of $500,000. It will make a cheap automobile, the intention being to market a two-passenger runabout to sell at $350.

Ausman Truck Factory Planned—A factory for manufacture of the Ausman motor trucks is to be established at Chattanooga, Tenn., with capital supplied by the Manufacturers' Assn. of that city. The plant will cost $100,000.

Big U. S. Tire Output—The April output of the Hartford, Conn., plant of the United States Tire Co. comprised 70,000 bicycle, 35,000 automobile and 150 tons of vehicle tires. The new power house, 108 by 68 feet, is nearly completed. The factory now employs about 1,700 hands.

Mansfield Tire Increases Output—The Mansfield Tire & Rubber Co., Mansfield, O., is increasing its tire output to 500 automobile tires a day.

Fourteen Plants Now—The home of the Detroit, Mich., Curling Club has been secured by the Studebaker Corp., and is now plant 14 in that company's system.

Detroit Top Company Builds—Meyers & Blackstock, Detroit, Mich., will soon open a factory at St. Louis, Mich., for the manufacture of automobile and buggy tops and similar articles.

Studebaker's $60,000 Assembling Plant—Plans were completed recently for a new two-story $60,000 building in St. Louis, Mo., for the Studebaker Corp. of America. This building will be an assembling plant. It will be of brick, concrete and terra cotta.

Buffalo Spring Company's Factory—The Buffalo, N. Y., Automobile Spring Co., recently incorporated, has leased for manufacturing purposes the two-story brick factory building at 146 Virginia street.

Painesville Citizens Want Factory—The citizens of Painesville, O., are agitating the question of securing an automobile factory for that town. The Vulcan Mfg. Co., recently incorporated to manufacture automobiles, is the concern which may locate in that city.

Heinz Electric Needs Men—Two hundred more men will be required for the factory of the Heinz Electric Co., Walkerville, Ont., this Lowell, Mass., concern having located there for the purpose of manufacturing spark coils and electric appliances for the Canadian and export trade.

Goodrich Purchases Land—The B. F. Goodrich Co. has secured some land on Chippewa Creek, Ont., 1 mile from Niagara River, on which it proposes to construct a large factory. The site was purchased from the Ontario Power Co. and that concern will supply the plant with electric power. The new rubber concern will manufacture rubber tires for automobiles as well as other rubber goods. Within a year 1,800 workmen will be employed in the plant.

Work on New Tire Plant—Owing to the fact that the ground on which they had planned to place their new building was wanted by the Pennsylvania Railroad, the members of the DeLion Tire and Rubber Co., Trenton, N. J., have changed their plans and will build their new factory about 300 yards from the original site. The building will be of the three-story type of brick and steel construction, which will render it practically fireproof. Cement floors will be used entirely.

Automobile Manufacturing in Canada—The manufacture of motor cars and trucks has made rapid strides in Canada. Windsor and Walkerville have already become the automobile center of that country. This is accounted for by the fact that it is extremely convenient for the Detroit, Mich., manufacturing firms to establish branches so close to the head offices. Among the latest to establish itself there is the Tudhope Motor Co., a branch of the Everett Motor Co., Detroit, Mich., which has purchased 10 acres in Windsor's factory district and has contracted to erect a $75,000 factory. The Tate Electrics, Ltd., financed by Canadian and American interests, has purchased a site in Ford City and is erecting a large automobile plant there.

General view of the main shop of the Duff Mfg. Co., Pittsburgh, Pa., taken prior to occupancy

Shows, Conventions, Etc.

May 20-23	Baltimore, Md., Spring Meeting, American Society of Mechanical Engineers.
June 2-7	Racine, Wis., "Made in Racine Exposition," J. I. Case Co.'s foundry.
June 5, 6, 7	Detroit, Mich., Midsummer Meeting of Society of Automobile Engineers.
October 13	Philadelphia, Pa., National Fire Prevention Conference, Philadelphia Fire Prevention Commission.

Race Meets, Runs, Hill Climbs, Etc.

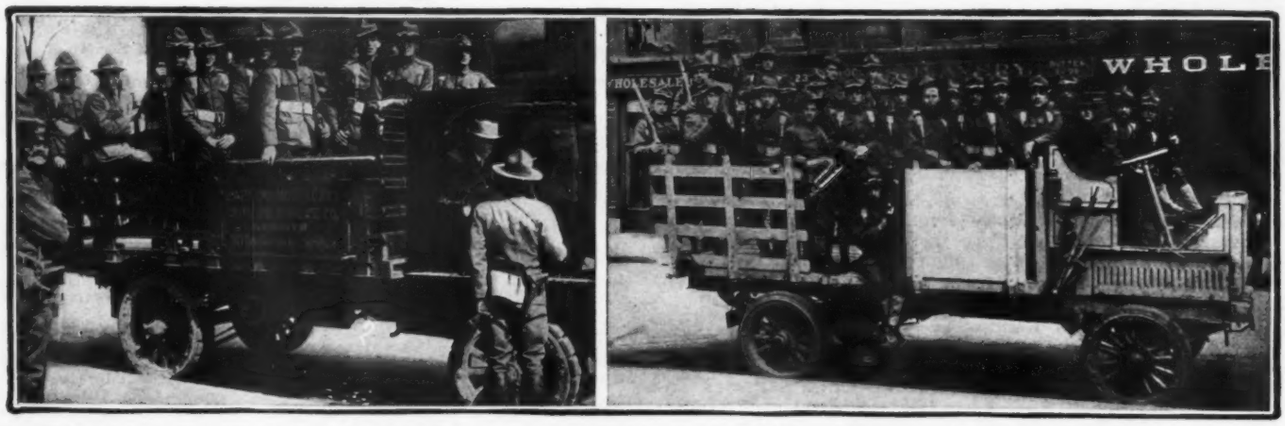
May 27-28	Chambersburg, Pa., Reliability Run, Chambersburg Motor Club.
May 29-30	Chicago, Ill., Inter-Club Reliability to Indianapolis, Ind., Chicago Motor Club vs. Illinois Athletic Club.
May 30	Indianapolis, Ind., 500-Mile Race, Speedway.
June 5	New York City, Orphans' Day Picnic at Glen Island, Orphans' Automobile Day Assn.
June 7	Philadelphia, Pa., Inter-Club Reliability, Quaker City Motor Club, Automobile Clubs of Delaware County, Philadelphia and Germantown.
June 10	Columbus, O., Reliability Run, Columbus Automobile Club.
June 14	Cincinnati, O., Hill Climb, Cincinnati Auto Dealers.
June 14-15	San Francisco, Cal., Track Races, E. A. Moross.
June 16, 17, 18	Columbus, O., Reliability Contest, *Ohio State Journal*.
June 19	Chicago, Ill., Algonquin Hill Climb, Chicago Motor Club.
June 21	Cincinnati, O., Hill Climb, Cincinnati, O., Automobile Dealers.
June 21	Philadelphia, Pa., Fletcher Cup Run, Automobile Club of Philadelphia.
June 21-22	San Francisco, Cal., Track Races, E. A. Moross.
June 23	Des Moines, Ia., Little Glidden Tour, Iowa Automobile Assn.
June 25-28	Chicago, Ill., Non-Motor-Stop Reliability, Chicago to Boston, Chicago Automobile Club.
July 1	Indianapolis, Ind., Tour of Indiana Automobile Manufacturers' Assn. to the Pacific Coast.
July 1-16	Winnipeg, Man., Motor Plow Competition, Dr. A. W. Bell, Manager.
July 4	Columbus, O., 200-Mile Track Race, Columbus, O., Automobile Club.
July 4	Taylor, Tex., Track Meeting, Taylor Auto Club.
July 4	Washington, D. C., Track Races, National Capital Motorcycle Club.
July 4-5	Sioux City, S. Dak., Track Meetings, Sioux City Automobile Club and Speedway Assn.
July 5-6	Tacoma, Wash., Road Race, Montemara Festa Automobile Committee.
July 8-16	Winnipeg, Man., Midsummer Exhibition, A. C. Emmett, Manager.
July 11	Twin City, Minn., National Reliability Tour, A. A. A.
July 20	Seattle, Wash., Track Races, E. A. Moross.
July 27	Grand Rapids, Mich., Tour, Grand Rapids Auto Club.
July 27-28	Tacoma, Wash., Tacoma Road Races.
July 28-29-30	Galveston, Tex., Beach Races, Galveston Automobile Club.
Aug. 5	Kansas City, Mo., Sociability and Endurance Run from Kansas City to Colorado Springs, Col., Kansas State Automobile Assn.
Aug. 12	Kansas City, Mo., Reliability Tour, Kansas State Auto Assn.
Aug. 29-30	Elgin, Ill., Elgin Road Races, Elgin Road Race Assn.
Aug. 30-Sept. 6	Chicago, Ill., Reliability Run, Chicago Motor Club.
Sept. 1	Columbus, O., 200-Mile Track Race, Columbus Auto Club.
Sept. 9	Corona, Cal., Track Race, Corona Auto Assn.
Oct. 4-11	Chicago, Ill., Around Lake Michigan Run, Chicago Motor Co.
Nov. 24	Savannah, Ga., Vanderbilt Cup Race, Motor Cups Holding Company.
Nov. 27	Savannah, Ga., Grand Prize Race, Automobile Club of America.

Foreign.

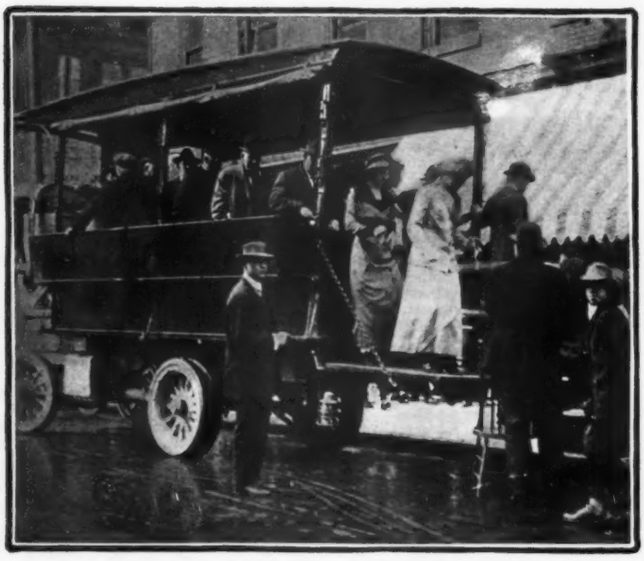
May	St. Petersburg, Russia, International Automobile Exposition, Building of Michael Maneze, Imperial Automobile Club of Russia.
June 3-7	London, Eng., Third International Road Congress, Rees Jeffrey, General Honorary Secretary.
June 23-28	London, England, International Road Congress.
July 12	Amiens, France, Grand Prix Race.
July 13	Paris, France, French Grand Prix Cyclecar Race.
July 18-26	London, Eng., Imperial Motor Transport Conference.
Aug. 28-30	Ghent, Belgium, Institute of Metals, Annual Autumn Meeting, Ghent International Exhibition.
Sept. 21	Boulogne, France, 3-Litre Race.
Sept. 25	Isle of Man, International Stock Car Race.
October	Paris, France, Paris Automobile Show.
October	Paris, France, Automobile Show, Grand Palais, 10 days.
November	London, Eng., Annual Automobile Exhibition, Olympia.

The Week in the Industry

Engineer — Dealer — Repairman — Garage



Men of Company C, N. Y. N. G., responding to hurry call for protection from rioting strikers and to guard a manufacturing plant in Syracuse, N. Y.



Scene at the recent car strike in Cincinnati, O., where the motor truck replaced the street car. The motormen and conductors were on strike for more pay; as a result all the lines were tied up and the motor truck proved a handy conveyance

TRUCKS IN LABOR STRIKE—Three companies of the New York National Guard were called out to subdue strike riots in Syracuse, N. Y., recently. For the first time in the history of such events in that city, motor vehicles, pleasure cars and trucks played an important part in the arrangements to preserve order. Several large motor trucks and half a dozen touring cars were kept at the Armory and when calls came from any part of the city asking for protection for non-union laborers, the soldiers were hurried to the spot in the trucks.

PROMOTION FOR MAXWELL—R. D. Maxwell has been appointed manager of the Studebaker branch retail store in Los Angeles, Cal.

WELDING FIRM IN VANCOUVER—Among the new industries established in Vancouver, B. C., is the new firm Oxo Welding & Machine Co.

NORMAN HEADS FORD BRANCH—F. B. Norman has been placed in charge of the branch of the Ford Motor Co., Detroit, Mich., in Portland, Ore.

DUNHAM DIAMOND TIRE MANAGER—C. A. Dunham has been appointed Pittsburgh, Pa., manager of the Diamond-Goodrich branch in that city.

PACKARD ADOPTS HARTFORD ABSORBERS—The Packard Motor Car Co., Detroit, Mich., will again adopt the Hartford shock absorber equipment.

LOZIER'S FRISCO BRANCH CHANGED—The San Francisco, Cal., branch of the Lozier Motor Co., Detroit, Mich., will move into larger quarters in the near future.

MCMARTIN PROMOTED—E. J. McMartin, of the Fisk Rubber Co., Chicopee Falls, Mass., branch, has been promoted to manager of the subsidiary branch at Butte, Mont.

TAKES MINNESOTA AIREASE RIGHTS—H. S. Waite, 1334 Nicollet avenue, Minneapolis, Minn., has taken the Minnesota rights for the sale of Airease. He will create agencies.

SHILAND RESIGNS FROM HAVERS—H. E. Shiland, sales manager of the Havers Motor Car Co., Port Huron, Mich., has resigned from that company, same to take effect June 1.

BUGBEE ASSISTANT GENERAL MANAGER—C. S. Bugbee, of Detroit, Mich., has received the appointment of assistant general manager of the Great Western Automobile Co., Peru, Ind.

ROCHESTER CLUB MOVES—The Rochester, N. Y. Automobile Club is moving its headquarters from the Hotel Seneca to Powers Hotel. The new clubroom will be 30 by 35 feet in size.

WALLACE FRANKLIN'S FRISCO MANAGER—W. D. Wallace, formerly of Seattle, Wash., has recently been appointed sales manager of the Franklin Automobile Co., in San Francisco, Cal.

HAYNES PUBLISHES HOUSE ORGAN—The Haynes Automobile Co., Kokomo, Ind., will publish a house organ. The initial number will be published on July 1. It will be a monthly publication.

DAWSON SUCCEEDS KEIP—A. R. Dawson has been made branch manager of the San Francisco, Cal., branch of the Lozier Motor Co., Detroit, Mich. He succeeds F. B. Keip, who recently resigned.

BUS LINE IN SCHENECTADY—An automobile bus line was started recently from Schenectady, N. Y., to Pittsfield, Mass., by Messrs. Welcome and Jordon. Two Packard cars constitute the service.

BULLOCK RESIGNS FROM HERRESHOFF—J. H. Bullock, assistant secretary and treasurer of the Herreshoff Motor Co., Detroit, Mich., has resigned and is in Houston, Tex., at present, having located there temporarily.

NEW INVADER OIL AGENTS—The Beck Corbitt Iron Co., St. Louis, Mo., and the Boyer-Campbell Co., Detroit, Mich., have taken on the full line of the products manufactured by the Invader Oil Co., New York City.

KEROSENE CARBURETOR ON HENDERSONS—The Henderson Motor Car Co., Indianapolis, Ind., announces that it will furnish a Harroun carburetor, using kerosene, at a slight additional charge on any of its second series models.

INDIANAPOLIS SHOW GIVES DIVIDEND—A dividend of 25 per cent. to those who exhibited at the automobile show held in Indianapolis, Ind., during the latter part of March, has been declared by the Indianapolis Automobile Trade Assn.

KELLY-SPRINGFIELD': NEW QUARTERS—The Kelly-Springfield Tire Co., New York City, has moved into new quarters at Broadway and 57th street. The solid and block tire department will, for the present, remain at 243 West 47th street.

STERNSFELS ADVERTISING MANAGER—C. D. Sternsfels has been appointed advertising manager of the Abendroth & Root Mfg. Co., Newburgh, N. Y., with headquarters at 50 Church street, New York City. This company manufactures motor trucks.

AUTOMOBILE APPAREL FIRM BANKRUPT—A petition in bankruptcy has been filed against C. E. Hottum, a manufacturer of automobile and livery apparel at 12 West 33d street, New York City. The liabilities are alleged to be $7,000 and assets $1,500.

LARGE $40,000 GARAGE FIRE—Fire which broke out in the Lafayette Garage, Lafayette, La., recently, consumed the entire building, together with the contents, consisting of twenty-three automobiles. Estimates of the losses sustained range from $35,000 to $40,000.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

BOSTON, MASS.—Britton-Stevens Motors Corp.; capital, $50,000. Incorporators: William H. Britton, Geo. D. Stevens, Chas. F. Pinkham.

BROOKLYN, N. Y.—Lil's Motors Co., Inc.; capital, $4,000; to do a general automobile and taxicab business. Incorporators: Thos. J. Qualey, Ethel McDonald, Geo. H. Wendling.

BUFFALO, N. Y.—Buffalo Automobile Spring Co., Inc.; capital, $10,000. Incorporators: Earl Plants, W. Edward Slater, Harvey Etlinger.

CHICAGO, ILL.—Knight & Kilbourne Patents Co.; capital, $1,000,000; to manufacture automobiles, engines and motors.

CINCINNATI, O.—Queen City Motor Delivery Co.; capital, $50,000; to deal in automobiles. Incorporators: M. C. Heintz, Harry G. Hehman, Albert F. Hehman, Louis Hehman, William F. Ray.

CONNERSVILLE, IND.—Van Auken Electric Car Co.; capital, $10,000; to do a general automobile business. Incorporators: G. C. Babcock, A. K. Babcock, C. L. Millard, B. D. Millard, H. M. Wylie.

DETROIT, MICH.—Monarch Motor Car Co.; capital, $30,000; to manufacture automobiles. Incorporator: August J. Bloom.

GALENA, O.—Galena Auto & Machine Co.; capital, $2,500. Incorporators: C. C. Wilmerton, Kenneth V. Johnston, Roy W. Wilmerton.

HAMILTON, ONT.—Hamilton Cadillac Motor Co.; capital, $40,000; to manufacture motor cars and other vehicles. Incorporators: James Nixon, Frank R. Newberry, James A. Sauriol.

INDIANAPOLIS, IND.—Fisher Automobile Co.; capital, $25,000. Incorporators: Carl G. Fisher, Harry L. Hammond, F. Ellis Hunter.

JACKSONVILLE, FLA.—S. & B. Motor Co.; capital, $10,000. Incorporators: B. D. Spinney, Jos. Lockwood, J. Stewart, Bertram.

JACKSONVILLE, FLA.—White Sales Co.; capital, $100,000; to engage in an automobile business. Incorporators: James R. Collins, P. D. Casidey, N. A. Collins.

JERSEY CITY, N. J.—Model Garage Co.; capital, $25,000; to do a general automobile business. Incorporators: J. F. Autenrieth, H. Finke.

LOUISVILLE, KY.—Automobile Clearing House Co.; capital, $2,500. Incorporators: C. L. Holden, W. J. Welch, Chas. H. Welch.

NEOSHO, MO.—Neosho Automobile Co.; capital, $3,500. Incorporators: J. F. Wills, F. S. Biggs, E. R. Rudy.

NEWCASTLE, IND.—Maxwell-Newcastle Mfg. Co.; capital, $50,000. Incorporators: Russel Willson, Romney L. Willson, Frank C. Olive, Harry Wilder, James W. Wellington.

NEW YORK, N. Y.—Tarrytown Motor Car Co.; capital, $250,000; to deal in automobiles. Incorporators: W. Odell, B. J. Knerr, A. M. Levy.

NEW YORK, N. Y.—Gerleit Auto Spring Wheel Co.; capital, $200,000; to deal in wheels, parts, etc. Incorporators: A. Gerleit, M. Vath, H. Heil.

NEW YORK, N. Y.—Fulton-Post Co., Inc.; capital, $1,000; to deal in motor and motor vehicles. Incorporators: Regis H. Post, William H. Fulton, L. M. Dietrich.

NEW YORK, N. Y.—The Motor-Compressor Co., Inc.; capital, $10,000; to manufacture motors. Incorporators: G. J. Spohrer, Chas. E. Van Vleck, Robert L. Redfield.

SHELBYVILLE, IND.—Meteor Motor Car Co.; capital, $150,000; to do a general automobile business. Incorporators: M. S. Wolfe, F. P. Wolfe, M. E. Hester.

ST. LOUIS, MO.—Admiral Motor Co.; capital, $60,000; to manufacture a new one-thousand pound truck and a light farm tractor.

SYRACUSE, N. Y.—Stowell Motor Car Co.; capital, $30,000; to deal in automobiles and motorcycles. Incorporators: Harry E. Stowell, R. Burns Avery, Fred H. Mabey.

WILMINGTON, DEL.—Victor Motor Car Co.; capital, $100,000; to deal in automobiles.

WYANDANCH, N. Y.—Consolidated Gas & Gasoline Engine Co.; capital, $15,000. Incorporators: Geo. H. Scanlan, F. B. Knowlton, E. J. Forhan.

GARAGES AND ACCESSORIES

BOSTON, MASS.—Massachusetts Garage Association; capital, $5,000. Incorporators: Josiah Hathaway, Chester I. Campbell, Frederick W. Boynton, John E. Savell.

BUFFALO, N. Y.—Frontier Transportation Co.; capital, $200,000; to operate a motor bus line. Incorporators: Giles G. Meindell, Irving F. Cragin, Francis L. Hoff.

BUFFALO, N. Y.—Couch-Georger Tire Agency; capital, $20,000; to handle tires and accessories. Incorporators: C. A. Couch, E. E. Howell, Frank P. Georger.

CHICAGO, ILL.—Vincennes Garage; capital, $2,500. Incorporators: Albert E. Lucius, Edward B. Lucius, J. Scott Matthews.

CHICAGO, ILL.—Ferns Motor Livery; capital, $50,000. Incorporators: M. M. Franey, Asher J. Goldfine, Harry P. Munns.

CLEVELAND, O.—Cleveland Automobile Country Club; capital, $7,500. Incorporator: T. P. Cogwin.

DALLAS, TEX.—American Tire & Rubber Co.; capital, $25,000; to deal in automobile accessories.

DALLAS, TEX.—The Original Punturelfix Co.; capital, $5,000. Incorporators: A. Marks, Vincent L. Hughes, A. F. Weisberg.

DAVENPORT, IA.—Positive Tire Vulcanizer Co.; capital, $10,000; to sell tire vulcanizers. Incorporators: W. G. Sanford, Chas. Huber, J. Reed Lane, P. A. Bendixen.

EAST ST. LOUIS, ILL.—Southern Illinois Traction Co.; capital increased from $1,500,000 to $7,500,000.

HAMILTON, O.—Star Taxicab Co.; capital, $5,000. Incorporators: Geo. C. Skinner, A. M. Skinner, William Miller, Merle Flenner, Millikin Shotts.

INDIANAPOLIS, IND.—Shinauto Mfg. Co.; capital, $10,000; to manufacture motor car polishes and soaps. Incorporators: W. L. Bedford, J. C. Sharp, M. A. Seligman.

MILWAUKEE, WIS.—Economy Motor Fuel Adjusting Co.; to manufacture a new type of carbureter. Incorporators: John McFarland, Max Grass, John J. Handley.

NEW YORK, N. Y.—Multiple Jet Carbureter Co., Inc.; capital, $1,000. Incorporators: Chas. A. Singer, Austin B. Palmer, Chester U. Palmer.

NEW YORK, N. Y.—Auto Polo Corp.; capital, $10,000; to promote auto polo. Incorporators: Hicks A. Weatherbee, Richard R. Sinclair, Philip Huetwohl.

NEW YORK, N. Y.—Troy Auto Bus Corp.; capital, $20,000; to operate an auto bus line. Incorporators: John Burdick, Ernest L. Snyder, John McGlynn.

NEW YORK CITY.—Globe Rubber Tire Mfg. Co.; capital, $1,500,000; to manufacture rubber tires and all accessories for automobiles. Incorporators: Harry D. James, Joseph P. Hall, Spencer Weart.

NEW YORK CITY.—Gallagher Carbureter Co.; capital, $300,000; to manufacture carbureters. Incorporators: Richard W. Gallagher, William M. Ford, Howard A. Johnston.

NEW YORK, N. Y.—Allenhust Auto Van & Express Co.; capital, $1,000. Incorporators: Charles Drewes, William Bohn, Johanne Bohn.

NEW YORK, N. Y.—Interboro Delivery Co., Inc.; capital, $1,000; auto vehicle delivery. Incorporators: Max Altschuler, Isidore Levine, Martin Radican.

NEW YORK, N. Y.—H. H. H. Tire & Mfg. Co.; capital, $50,000; to manufacture and deal in automobile tires. Incorporators: J. H. Dravle, Wm. C. Burroughs, John J. Coyle.

SAN ANTONIO, TEX.—International Automobile School; capital, $4,000; to instruct pupils to handle automobiles. Incorporators: Thomas P. Price, Gus Leroy, John A. Kerr.

WILMINGTON, DEL.—Pneumatic Rim & Tire Co.; capital, $200,000. Incorporator: Harry W. Davis.

CHANGES OF NAME AND CAPITAL

MILWAUKEE, WIS.—Milwaukee Motor Co.; capital increased from $250,000 to $300,000.

SANDUSKY, O.—Suspension Roller Bearing Co.; capital increased from $250,000 to $300,000.

SPLITDORF BRANCH OPENED—The Splitdorf Electrical Co., New York City, has opened an Atlanta, Ga., branch, situated at 8 Harris street. O. J. Rohde, who opened the Atlanta, Ga., branch, will shortly open a Newark, N. J. branch. Toronto, Ont., will shortly have a branch.

SMALL RESIGNS—A. H. Small has resigned from the Oakland-Wisconsin Motor Co., Milwaukee, Wis., to become Wisconsin field representative for the Marion Motor Car Co., with headquarters in the E. F. Sanger Co. garage, Milwaukee, representative of the Marion and Stearns.

METALLURGIQUE AGENTS BANKRUPT—W. C. and H. N. Allen, doing business as the Metallurgique Motor Co., selling agents for automobiles at 1876 Broadway, New York City, have filed a petition in bankruptcy with liabilities of $67,928 and assets $8,070, consisting of accounts $7,556, stock $150 and cash in bank $364.

TIMKEN ENLARGES N. Y. BRANCH—Increase of eastern business has made it necessary for the Timken Roller Bearing Co., and the Timken Detroit Axle Co., Detroit, Mich., to double the size of their New York City branch at Broadway and 68th street. They have leased the store next to their former place, throwing the whole into one large room.

FORD'S HAMILTON GARAGE OPENED—The new three-story garage of the Ford Motor Co., recently completed at 74 John street, north, Hamilton, Ont., was recently opened. The ground floor is used as a showroom, office and garage, while the two upper floors are devoted to repair work, and stock room. The garage is one of the largest in the province of Ontario.

NEW BOSCH SUPPLY STATIONS—The following Bosch supply stations have been selected by the Bosch Magneto Co., New York City, in their respective territories: Reed Motor Supply Co., St. Paul, Minn.; W. D. MacMillan, Jr., Wilmington, N. C.; Kinston Garage, Kinston, N. C.; Cuskaden Auto Supply Co., Atlantic City, N. J.; J. T. Cox, Penn Yan, N. Y.; Wichita Garage Co., Wichita, Kans.; The Auto Supply Co., Hutchinson, Kans.; and the Severin-Lumbard Tire & Supply Co., Oklahoma City, Okla.

Government officers watching truck climb mountain near Columbia, Pa., during Government truck trials

Washington Post Commercial Truck Test. White 1,500-pound truck climbing hill between Frederick and Hagerstown, Md.

United States Government officials in the Washington Post Reliability Run. They are, from right to left, Messrs. Edgerston, Austin, Boyd and Ayers

Great interest was shown at each stop during the recent Washington Post Reliability Run. This shows the cars parked in the city square at Hanover, Pa.

WARREN COMPANY'S BUSINESS CONTINUED—The Detroit, Mich., Trust Co., receiver of the Warren Motor Car Co., has notified the creditors that the business of the company will be continued under the management of the Trust Company and that the policy of the receiver will be to purchase material and merchandise as much as possible from the creditors of the company.

FOREIGN TRADE OPPORTUNITIES—A firm of automobile dealers in the United Kingdom informs an American consulate that it wished to get in touch with manufacturers who specialize in the production of the various component parts of automobiles suitable for erecting a complete chassis of not over 80 millimeters bore. File No. 10,871, Bureau of Foreign and Domestic Commerce, Washington, D. C. A business man who has already placed a number of American articles on the British market informs an American consulate that he would like to correspond with manufacturers of a two-seated runabout automobile, retailing for about $500. File No. 10,800. A South American business firm informs an American consular officer that it desires to be put in touch with manufacturers of tires for automobiles. Correspondence should be in Spanish. File No. 10,819.

New Agencies Established During the Week

PLEASURE VEHICLES

Place	Car	Agent
Asbury Park, N. J.	Regal	Mark Guy.
Belle Mead, N. J.	Regal	R. I. Cruser.
Birmingham, Ala.	Cole	Cole Motor Car Co.
Birmingham, Ala.	Oakland	Judge Dan A. Greene.
Bloomfield, N. J.	Regal	Central Motor Car Co.
Boston, Mass.	Chandler	Chandler Motor Car Co.
Boston, Mass.	G. J. G.	Cole Motor Co.
Boston, Mass.	Ohio	Cole Motor Co.
Brooklyn, N. Y.	Chandler	Tanner Motor Car Co.
Brooklyn, N. Y.	Regal	C. S. Tate.
Catskill, N. Y.	Regal	Peerless Garage Co.
Closter, N. J.	Regal	W. H. Roberts.
Cold Spring, N. Y.	Regal	Phyfe's Garage.
Dunnellen, N. J.	Regal	Dunnellen Garage.
Elizabeth, N. J.	Regal	Elizabeth Automobile Co., Inc.
Evansville, Wis.	Studebaker	F. P. Carrier.
Glen Cove, L. I.	Regal	L. T. Simonson.
Hackensack, N. J.	Regal	W. R. Schoonmaker & Son.
Hartford, Conn.	Regal	A. J. Cassky.
Hempstead, L. I., N. Y.	Regal	Hutcheson Bros.
Hoquiam, Wash.	Franklin	Hoquiam Auto Co.
Islip, L. I.	Regal	Frank Gates.
Jersey City, N. J.	Regal	B. Rickard.
Joplin, Mo.	Kissel	Lyscio & Walker.
Kingston, N. Y.	Regal	Wall Street Garage.
Lomire, Wis.	Imperial	Lomira Auto Co.
Massillon, O.	Franklin	Jacob Von Gunten.
Middletown, N. Y.	Regal	Brown's Garage.
Milwaukee, Wis.	Case	William Diemann.
Milwaukee, Wis.	King	Creek Motor Sales Co.
Monroe, Wis.	Hupmobile	Genger & Feeser.
Newark, N. J.	Franklin	Carlough & Mallon.
Newark, N. J.	Regal	Oldsmobile Co. of Newark.
New Brunswick, N. J.	Regal	S. A. M. Garage.
New Canaan, Conn.	Regal	Regal Motor Car Sales Co.
New Haven, Conn.	Regal	C. A. Bunnell.
New London, Conn.	Regal	Lathrop & Smith.
New York, N. Y.	Regal	Regal Auto Sales Co.
Oakes, N. D.	Kissel	J. E. Bush.
Paterson, N. J.	Regal	T. H. Muth.
Plymouth, Pa.	Regal	S. Reese Machine Tool Co.
Putnam, Conn.	Regal	G. A. Vaughan.
Raleigh, N. C.	Franklin	Byrum & Hillyer.
Red Bank, N. J.	Regal	F. H. Van Dorn.
Sayville, L. I.	Regal	Stenger & Rohm.
Scranton, Pa.	Regal	Eureka Motor Car Co.
St. Cloud, Minn.	Kissel	Menec & Bisenius.
Staten Island, N. Y.	Regal	E. T. Shortt.
St. Louis, Mo.	Case	H. B. Daniels.
St. Louis, Mo.	King	Heinrich Automobile Co.
St. Louis, Mo.	Velie	Velie Motor Co. of Missouri.
Stoughton, Wis.	Overland	Roe Automobile Co.
Syracuse, N. Y.	Maxwell	E. P. Young.
Syracuse, N. Y.	Regal	E. P. Young.
Torrington, Conn.	Regal	C. C. Haight.
Trenton, N. J.	Regal	Carl Endebrock.
Waukesha, Wis.	Crown	Davies Bros.
Weyauwega	Oakland	Weyauwega Garage.
West Pittston, Pa.	Regal	Stroh Auto Co.
Yonkers, N. Y.	Regal	R. B. Timm.

COMMERCIAL VEHICLES

Place	Car	Agent
Akron, O.	Sandusky	H. E. Kepler Auto Co.
Alliance, O.	Sandusky	Al. Shem.
Arcata, Cal.	B. A. Gramm's	W. A. Preston.
Baltimore, Md.	Dart	G. A. Wehr.
Berea, O.	Sandusky	Hathaway Motor Co.
Boston, Mass.	Maccarr	Britton-Stevens Co.
Boston, Mass.	Smith-Milwaukee	Britton-Stevens Co.
Butler, Pa.	Dart	A. C. Hileman.
Camden, N. J.	Indiana	N. J. Auto & Supply Co.
Clarksburg, W. Va.	Indiana	D. Scott Thompson.
Cleveland, O.	Mercury	Mercury Mfg. Co.
Colchester, Ill.	Dart	Colchester Auto Co.
Edmonton, Alberta, Can.	Indiana	Freeman & Co., Ltd.
Fort Dodge, Ia.	Dart	Tremaine & Rankin.
Fort Plain, N. Y.	Stewart	H. B. Gray Co.
Fort Worth, Tex.	Dart	Mayer & Strickland.
Glenns Falls, N. Y.	Sanford	Miller Price.
Green Bay, Wis.	Best	DuBois, Haevers & Co.
Harrisburg, Pa.	Dart	Ensminger Garage.
Herkimer, N. Y.	Stewart	G. E. Clark.
Hudson, N. Y.	Stewart	Wm. Petry Garage.
Indianapolis, Ind.	Vulcan	John W. Hogan.
Ithaca, N. Y.	Indiana	Cornell Transfer.
Johnstown, N. Y.	Stewart	Johnstown Motor Car Co.
Lorain, O.	Sandusky	Hagaman & Nichols.
Los Angeles, Cal.	Sanford	Hawley King & Co.
Luxemburg, Mo.	Palmer	Louis Schnellman.
Manistique, Mich.	Dart	W. J. Bebeau.
Mansfield, O.	Sandusky	Herring Buggy Co.
Mattese, Mo.	Palmer	H. J. Jenneman.
Maxwell, Mo.	Palmer	C. J. Siedler.
Milwaukee, Wis.	Dart	H. F. Wiesenthal.
Newark, N. J.	Chase	Chase Motor Truck Co.
Newark, N. J.	Indiana	D. E. Morris.
New York City	Indiana	Indiana Motor Truck Co.
New York City	Sanford	F. T. Sanford Auto Co.
Newburg, N. Y.	Dart	C. H. Bellinger.
Newport, R. I.	Dart	G. A. Smith.
Northampton, Mass.	Stewart	Draper Garage.
Norwich, Conn.	Sanford	F. O. Cunningham.
Oakland, Cal.	B. A. Gramm's	Miller & Dryer.
Quincy, Ill.	Dart	Quincy Garage.
Red Bank, N. J.	Stewart	F. H. Van Dorn.
Reading, Pa.	Sanford	Deysher Furniture Co.
Reno, Nev.	Dart	J. C. Dunham.
Rochester, N. Y.	Sanford	Mandery Motor Car Co.
Sacramento, Cal.	B. A. Gramm's	King & Son.
Salt Lake City, Utah	Dart	Inter-Mountain Transportation Co.
Saratoga, N. Y.	Sanford	Ross Ketcham Garage.
San Antonio, Tex.	Indiana	Guarantee Motor Car Co.
San Diego, Cal.	Sanford	P. M. Price.
San Francisco, Cal.	Indiana	Auburn Sales Co.
San Jose, Cal.	B. A. Gramm's	San Jose Implement Co.
Sidney, Australia	Sanford	Hippsley & Waddell.
Sisterville, W. Va.	Indiana	Reno Oil Co.
Somerville, Mass.	Sanford	Orr J. Palmer.
South Seattle, Wash.	Indiana	G. W. Hoffman.
St. Louis, Mo.	Adams	Lewis Automobile Co.
Stockton, Cal.	B. A. Gramm's	Hansel & Ortman.
Syracuse, N. Y.	Standard	A. J. Jackson.
Tama, Ia.	Dart	Harlan & Cory.
Toledo, O.	B. A. Gramm's	Grasser Motor Co.
Utica, N. Y.	Sanford	A. A. Lederman.
Vancouver, B. C.	Indiana	Hall & Wallace.
Worcester, Mass.	Sanford	R. E. Northridge.
Yokohoma, Japan	Sanford	Melchior, Armstrong & Dessau.
Youngstown, O.	Indiana	A. E. Halliden.

ELECTRIC VEHICLES

Place	Car	Agent
Boston, Mass.	Lansden	Britton-Stevens Co.
Hartford, Conn.	Rauch & Lang	R. D. & C. O. Britton Co.
Indianapolis, Ind.	Chicago	J. F. Wild Auto Co.
Meriden, Conn.	Rauch & Lang	R. D. & C. O. Britton Co.
Middletown, Conn.	Rauch & Lang	R. D. & C. O. Britton Co.
Springfield, Mass.	Rauch & Lang	R. D. & C. O. Britton Co.
Superior, Wis.	Detroit	Superior Water, Light & Power Co.